

Encoders in automated guided vehicle systems

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The automated guided vehicle (AGV) systems from MLR System ensure flow of materials in production, assembly areas and warehouses. Goods can be picked up automatically from their staging areas, safely transported and delivered to their destination areas. The task of establishing the speed, the vehicle steering angle and the exact position of the load carriers is carried out by CANopen-capable encoders and draw-wire systems from Kübler.

Suited for many applications

The AGV systems render transport processes transparent and facilitate the calculation of costs. They reduce logistical costs by shrinking personnel costs and inventory and by avoiding incorrect deliveries and shipping damage. Each system (AGVs, guidance control system, power supply, equipment for position and location determination, equipment for data transmission as well as infrastructure and peripheral devices) must be customized to the task in question and to the environmental conditions.

MLR offers a range of combinations of vehicles and navigation systems. The Motormouse series provides a high level of functionality and offers low-cost installation of the route together with lower vehicle costs than with traditional systems. The compact Caesar series transport



Miniature 24-mm encoders may be installed where space is confined

goods safely in applications with limited space. The machines can carry loads 'on their back' or be used as tractor vehicles. Phoenix or I-SIS series can pick up loads from floor level and hoist them up to a height of 3m. The Casero series has been designed for use in public buildings, such as hospitals, care homes, hotels or offices.

AGV technology

The AGVs move fully automatically and securely to their destination within the assembly hall or ware-

house, from the storage location to the machine or production line and then back again. After their work is done they head for the docking station in order to charge their batteries. Unlike with guide wire systems, where sensors follow an optical or metallic wire strip or a guide wire embedded in the floor, in free navigation systems the routes are pre-programmed and stored virtually in the vehicle controller. These vehicles need to have a compact construction so that their routes can be laid out to save as much space as possible.

All travel and handling movements are controlled via sensors for distance and angle measurement. Their quality determines the accuracy of the navigation and the frequency of required course corrections. The vehicle can correct for discrepancies between the real route traveled and the virtual route in the following ways: with magnetic navigation the vehicle detects reference magnets in the floor and with laser navigation it orientates itself either using artificial landmarks (reflectors) or with reference to

existing structures such as walls, niches, openings and pillars by means of a laser sensor.

Sensors from one source

The incremental encoders of type 2400 measure the speed. One encoder sits on each of both the right and left drive wheel and supplies real-time signals to the controller. Absolute encoders of the Sendix M36 series measure the angle of the steering axle. The position value is transmitted to the controller via a CANopen interface. The load to be transported has to be picked up at various locations from bins situated at various heights and then unloaded and deposited at various other places. The height of the carrier vehicle is measured via a B80 or C120 draw-wire system, which covers a measuring range of up to 6m. Here the height of the carrier is converted into rotary motion by means of a wire and drum. The position value is then measured with an absolute multi-turn encoder, which sends it to the controller via the CANopen interface. Even if the vehicle has been switched off, the absolute position of the AGV is immediately available when it is switched back on. As experts for length and angle measurement in drive and positioning systems Kübler is able to supply the required components and according consulting services from one source.

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Encoder solutions

Kübler encoders of the IP69K-protected Sendix M36 series with shock loadings of 500 g and vibration loadings of 30 g have been specially designed for use in mobile automation. Shaft seals and fully-encapsulated electronics protect against steam or high pressure cleaning. The encoder works in temperature range of -40 °C to +85 °C.

Thanks to their compact design with an outside diameter of 24 mm, the 2400 miniature encoders with resolution of 1024 pulses per revolution are suited for use in confined spaces. As with the draw-wire systems, they operate in an ambient temperature from -20 °C to +85 °C.