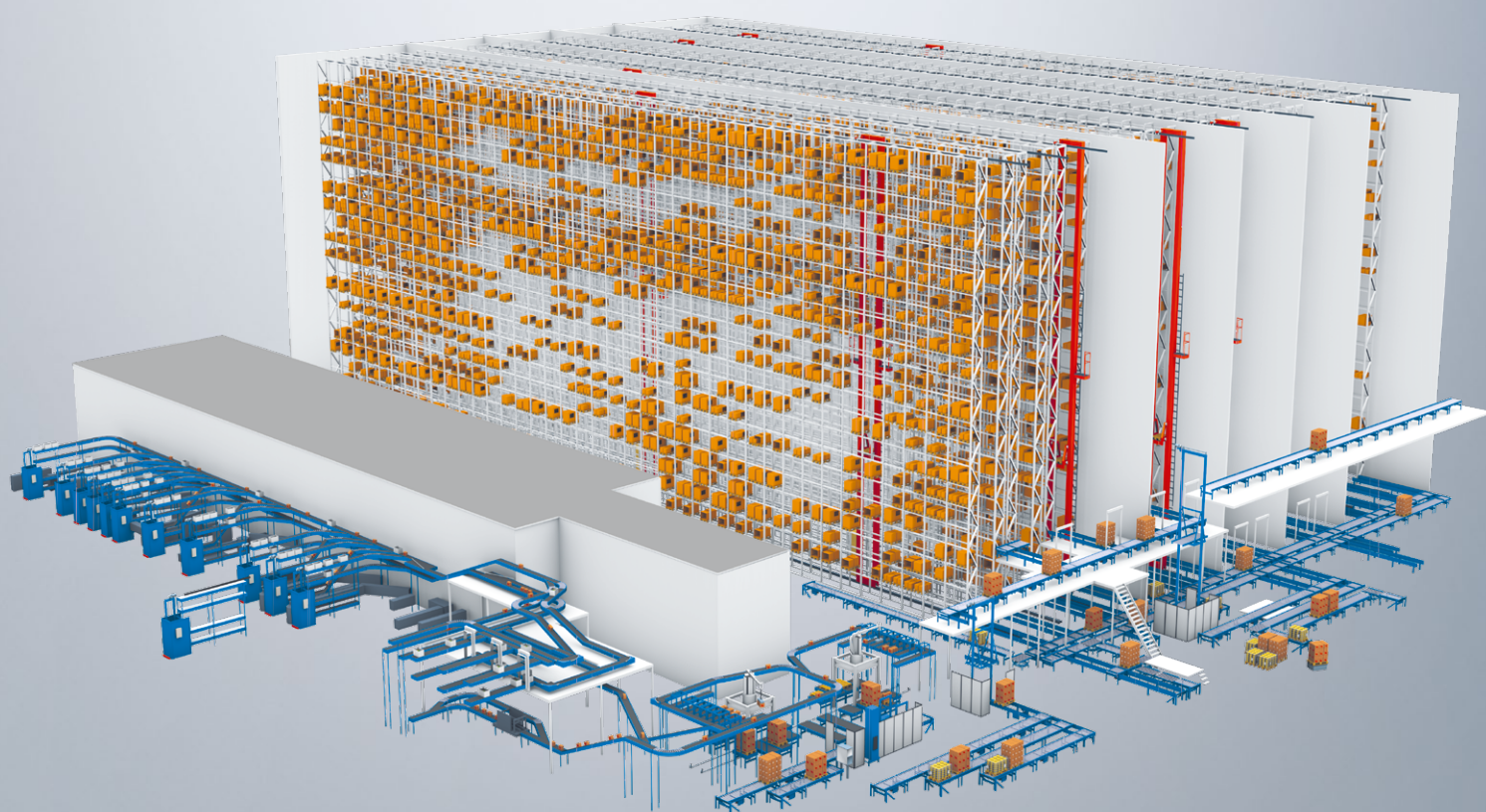


BECKHOFF New Automation Technology

Flexible, powerful, compact:
Control technologies for Automated
Storage and Retrieval Systems (AS/RS)



Boost AS/RS performance with New Automation Technology

Beckhoff provides open, scalable and real-time control technologies that intralogistics equipment suppliers, fulfillment and parcel centers need to succeed in today's fast-paced markets. From compact machine control and high-performance networking solutions to a robust motion control portfolio, our COTS (commercial off the shelf) products meet the highest standards of quality, reliability, vibration/shock/temperature resistance and safety for extended use in AS/RS applications.

Your benefits with Beckhoff technology:

- Our industrial controllers and other products offer a small footprint, enabling them to fit into increasingly compact AS/RS shuttle systems.
- One Cable Technology (OCT) reduces the complexity, installation costs and housing volume of intralogistics automation systems.
- EtherCAT delivers the highest performance of any industrial Ethernet system and superior bandwidth utilization for transmitting large volumes of critical data. As the most open fieldbus, EtherCAT provides gateways to all modern industrial protocols. Because EtherCAT

is the only protocol that supports a single-network architecture for an entire intralogistics enterprise, it is the clear choice for fulfillment and parcel operations.

- Each Beckhoff controller has an on-board device management web server for viewing and maintaining both software and hardware status and specifications, version control, and even internal temperature and fan health (if one on-board). This data can be remotely monitored, alarmed via the PLC, and sent to the enterprise or a cloud service and can be a powerful tool in managing controllers across

the fleet of AS/RS shuttles and across an entire enterprise.

- From a new machine to equipment with third-party controllers, TwinCAT lets you record and transmit data seamlessly. By enabling real-time machine learning, TwinCAT Machine Learning helps machines automatically reduce mechanical wear, unlock greater energy efficiency and minimize costs, such as for AS/RS shuttles.
- Our controls integrate Safety over EtherCAT (FSoE), a universal open standard that meets the requirements up to Safety Integrity Level

SIL 3 according to IEC 61508 and Category 4 PLe according to ISO 13849-1. It also allows for STO/SS1 across EtherCAT, eliminating separate safety input modules, wiring or discrete I/O terminals. FSoE also supports analog and encoder safety solutions via Beckhoff's TwinSAFE SC. The encoder on the motors and an external encoder connected to a TwinSAFE SC encoder input terminal can compare the position and put the system into a safe state if the shuttle gets too far out of position.

► www.beckhoff.com/intralogistics



Benefits for many AS/RS types

- shuttle systems
- vertical and horizontal carousels
- cube-based storage
- unit and mini load systems
- vertical lift modules (VLM) and indexing conveyors (VIC)
- goods to operator and goods to robot (G2O/G2R) pick stations

© Swisslog



G2R (goods to robot) pick stations

Our TwinCAT automation software also offers the ideal platform for robotic applications such as G2R pick stations. TwinCAT Kinematics and TwinCAT Vision can be fully integrated with the TwinCAT PLC on one powerful, centralized automation controller with integrated safety. This eliminates the latency between the material handling systems bringing the product to the pick station, the robot controller and vision system. These instead can be combined into one powerful machine controller for optimal performance and system integration as well as enhanced protection from system obsolescence.

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Open, scalable and real-time: Beckhoff control solutions

Beckhoff provides a range of automation solutions suited to AS/RS applications. Our industrial control hardware ranges from compact entry-level controllers with ARM processors, to multi-core industrial servers with 40-core Intel® Xeon® processors. Embedded controllers support local data collection via large-capacity CFast cards, as well as hard disk and solid-state disk drives. Devices also offer large amounts of RAM for faster operations.

By producing our motherboards in-house, we guarantee stable performance in the field during the long life of the product and enable drop-in replacement of new controllers into

existing TwinCAT software projects, providing optimal protection from system obsolescence. And whether using widely distributed or centralized architectures, distribution centers can benefit from the added scalability of our controllers and TwinCAT platform, which can run on every Beckhoff controller from entry level to the top of the line.

Our TwinCAT automation platform supports many open and modern standards for vertical communication to the warehouse control system (WCS), warehouse execution system (WES), to the cloud – and horizontal communication across the entire enterprise. TwinCAT also supports legacy communi-

cation required in brownfield installations. Additional features and benefits include:

- extensive engineering tools and languages: all IEC 61131-3 PLC languages, Microsoft Visual Studio® languages and real-time C++
- broad horizontal and vertical communication
- flexible, integrated and distributed machine safety
- vertical communication including OPC UA, MQTT and HTTPS/REST
- many maintenance and diagnostic tools
- free engineering tools and support

Our EtherCAT I/O solutions incorporate the broadest range of signal types in the industry and include:

- IP20 terminals and IP67/69K I/Os
- plug-in modules for custom board design
- EtherCAT P, the One Cable Automation solution for reduced cable routing
- numerous TwinSAFE safety I/Os
- many protection terminals, such as overcurrent, surge and NEC Class 2 circuit, as well as power measurement for smart monitoring and diagnostics

Other features include high-performance EtherCAT with extensive diagnostics, compact configurations and high vibration and shock resistance. This range is critical in highly dynamic AS/RS applications as well as other intralogistics systems.

The extended temperature ranges make the I/Os suitable for medium and low-temperature freezer cold storage applications. And the IP ratings further support applications in grocery, beverage and pharmaceuticals, which require high-pressure wash-down and hygienic designs.



► www.beckhoff.com/twincat3



► www.beckhoff.com/c60xx



EtherCAT

► www.beckhoff.com/ethercat

Compact and integrated: Beckhoff motion control solutions

Whether running on batteries or powered rails, AS/RS shuttles require low voltages. Our 24–48 V DC control products ideally include integrated servo drives, compact brushless DC (BLDC) terminals and more.

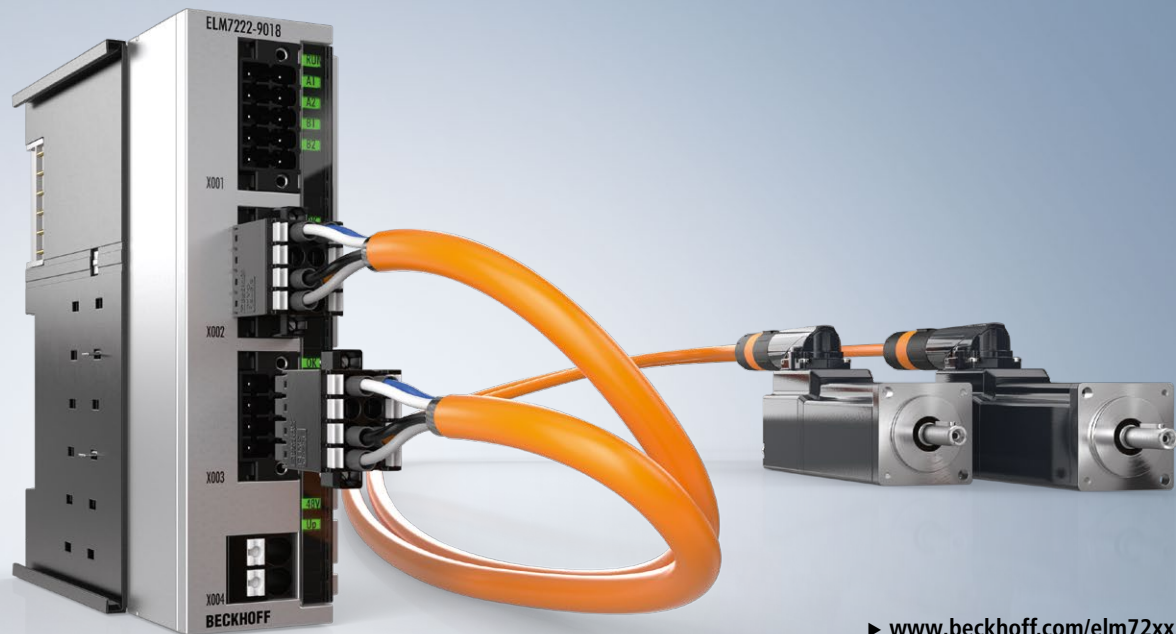
Mounted into the I/O system, ELM72xx devices are higher-current servo drives with OCT. The dual 8-amp model reduces footprint and costs by combining control for two axes into a single drive. Another advantage for AS/RS shuttles is the built-in brake chopper with an external brake resistor connection, which absorbs regenerative energy created during deceleration or braking.

The compact motion portfolio includes stepper motors and controllers, pulse width modulation controllers, DC and BLDC motor controllers and gearboxes.

For further cabinet size reduction, critical for small shuttles, integrated servo motors are available in both 24-48V DC range as well as full AC voltage range. This combination of drive and motor relocates the drive from the cabinet to the machine, reduces cabling, and improves the modularity of the system. The unique design also greatly reduces derating common of other integrated offerings.



► www.beckhoff.com/ami81xx



► www.beckhoff.com/elm72xx

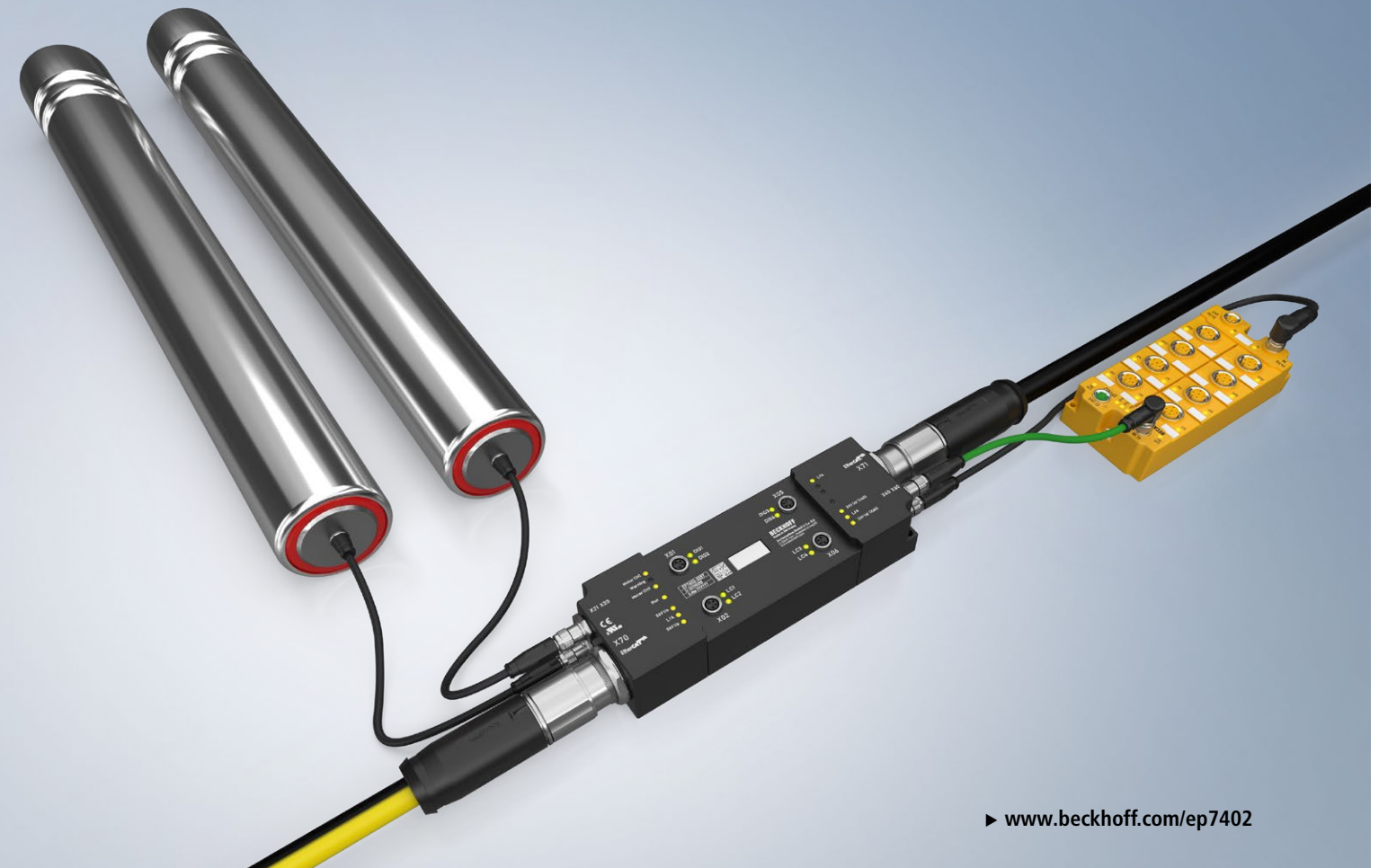
Product spotlight: EP7402 MDR controller

Motor-driven roller (MDR) conveyor systems often carry bins and totes from AS/RS lift stations to the pick stations. To enhance MDR efficiency, communication and cabling, our EP7402 EtherCAT Box offers optimal control for multi-zone conveying systems in intralogistics applications.

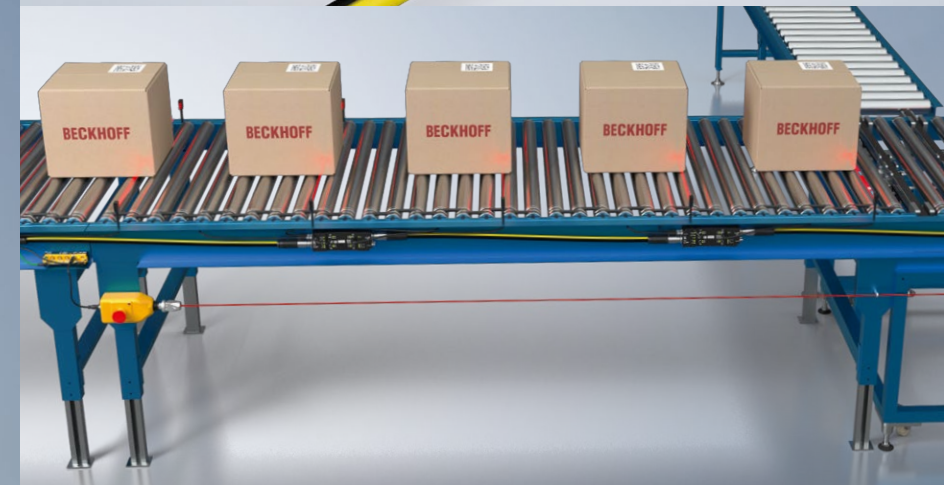
The MDR controller is a compact, two-channel motor output stage for BLDC motors, regardless of the conveyor or roller motor vendor. Measuring just 174 x 60 x 36.5 millimeters, this IP67-rated device mounts easily in standard C-channel or

L-brackets on the conveyor frame and requires no additional protective covering, meeting NFPA 79 standards.

The unique solution combines One-Cable Technology for delivering up to 28 A of power to the rollers, EtherCAT communication and a power circuit for peripheral electronics and EtherCAT devices. The EP7402 handles back EMF, a common failure mode, and short-term excess amperage without internal fusing failure even when roller motors stall with a high load.



► www.beckhoff.com/ep7402



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We reserve the right to make technical changes.