

PACKAGING MACHINERY AUTOMATION

WELCOME TO THE WORLD OF AUTOMATION



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YOUR GLOBAL PARTNER

For over 40 years, KEB Automation KG has been an innovative designer and manufacturer of automation products. More than just a component supplier, KEB works with their customer-partners to provide the optimum solution for the application.

Trust KEB with your next project.

KEB AMERICA

KEB America, Inc. is headquartered in Shakopee, MN, a suburb outside of Minneapolis. KEB America has full design and manufacturing capabilities in its 86,000 sq ft facility to provide our North American clients with local service and support. KEB America's facility is ISO 9001:2008 certified.





Major sales and service facilities

- 4 global production sites
- 9 subsidiaries
- 37 representatives and service partners

1,200+ employees Annual sales: ~\$250M USD



PRECISE. REPEATABLE. RELIABLE. PROVEN.

That is what describes KEB automation products and the machines we power. KEB offers a full automation portfolio ranging from brakes to HMI touchscreen displays. KEB products allow the design of fast and precise packaging machinery with a reputation for reliability.

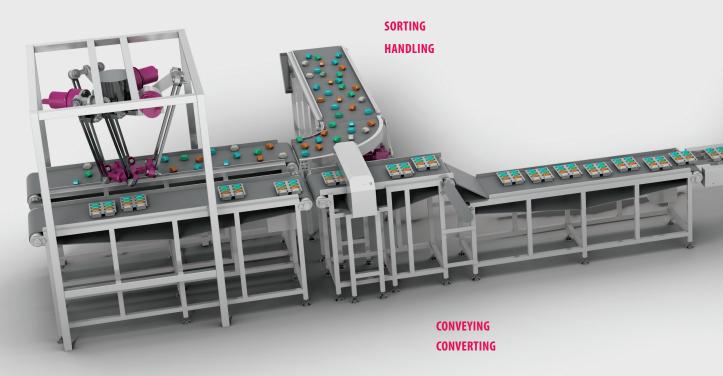
With a worldwide presence KEB is there to support our products wherever they go so you can ensure your products get where they need to go safely and securely.

KEB

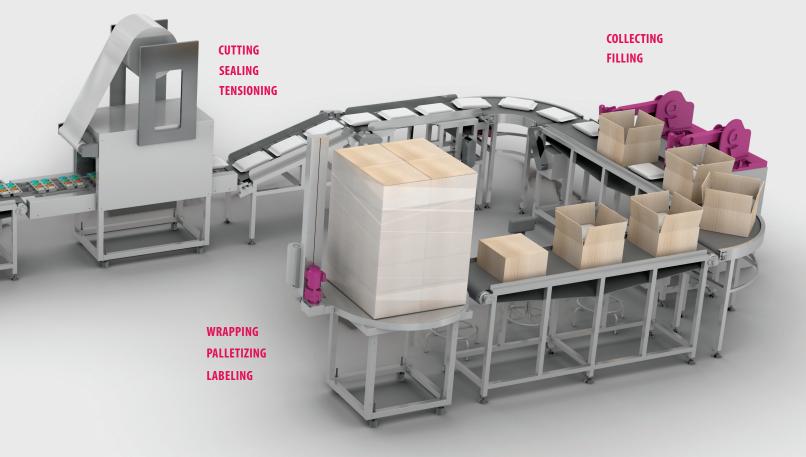
A solution for every step

For more than 45 years KEB has been perfecting the development of automation and control solutions. The catalog of products we offer can be used at nearly any point in the packaging line. KEB is more than a component supplier – instead, we are a complete automation solution provider.





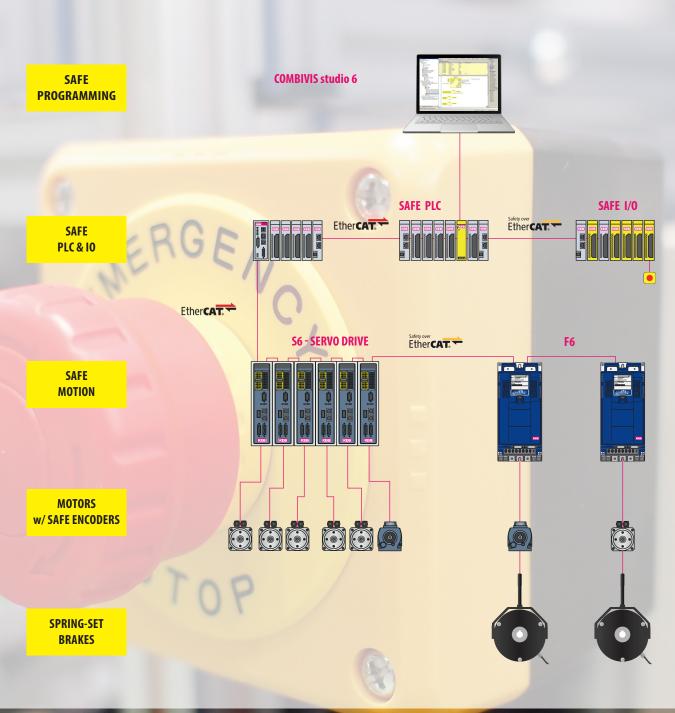
KEB





KEB is an active member of the OMAC group.

KEB INTEGRATED SAFETY SOLUTION





COMBIVIS STUDIO 6 SAFETY - PLC PROGRAMMING



Programming IDE

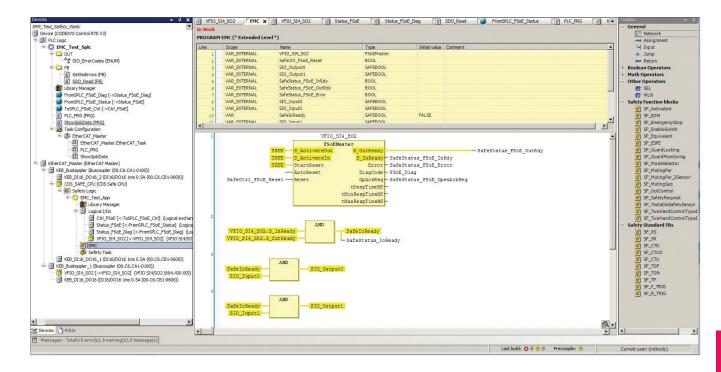
With KEB's **COMBIVIS studio 6 Safety** machine designers can meet compliance with IEC 61508 SIL3 and ISO/EN 13840 PL e. Studio 6 Safety uses a TÜV Rheinland-certified CODESYS plug-in which is fully integrated in KEB's COMBIVIS studio 6 development environment.

This means the machine and safety program can be developed in one unified software platform. The safety controller programs as a sub-node of the main machine controller and the application, tasks, global variable lists, POEs and logic I/Os are integrated.



Function block programming

The safety controller is programmed through a Function Block Diagram (FBD) Safety Editor in IEC61131-3. The FBD Safety Editor contains certified safe modules according to PLCopen Safety. The safety modules facilitate the programming of common machine elements like e-stop circuits, light curtains, and two-handed control.



Safe project management

Studio 6 Safety also offers additional functionality for managing the project. This includes change tracking, safe signal flow, safe versioning (pinning), and the separation of safe mode and debug mode.

Drive commissioning and safe motion

Integrated Safe Drive functions are also commissioned with Studio Safety. This is where the safety functionality and limits can be configured. The IDE also features a checksum to make sure the drive receives the correct download.

Parameter	Value	Import sate configuration data from parameter list
Filter time of the safety inputs		Load default values
Filter time of the STO-Inputs	0.010000	S
Filter time of the SBC-Inputs	0.010000	s
Filter time of the Function1-Inputs	0.010000	S
Filter time of the Function2-Inputs	0.010000	s
Filter time of the Ripple-Inputs	0.010000	s
Test signal input configuration		
Test signal period	10.000000	S
Test signal pulse length	0.001000	s
Check of the test-signal for the STO-Inputs	off	
Check of the test-signal for the SBC-Inputs	off	
Check of the test-signal for the Function1-Inputs	off	
Check of the test-signal for the Function2-Inputs	off	
STO input configuration		
Tolerance time of the STO-Inputs	0.010000	S
Status of the STO-Inputs	equivalent	
SBC input configuration		
Tolerance time of the SBC-Inputs	0.010000	e

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SAFETY PLC & IO

FSoE safety master



HIGHLIGHTS

- Fail Safe over EtherCAT (FSoE) master and slave IO modules
- TÜV Rheinland approved
- IEC 61508 SIL3 and EN/ISO 13849-1 PL e
- Black channel approach main and safe control on the same bus
- Safety PLC can be used in decentralized topology
- Safe I/O can be distributed remotely

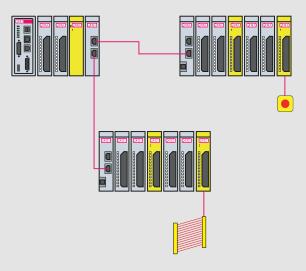




Advantages of Fail-Safe over EtherCAT (FSoE)		
Certif	ied	By TÜV SÜD (up to SIL3)
Open		Managed by EtherCAT Technology Group (ETG)
Prove	n	FSoE established in 2010
Flexib	ole	Machine PLC and Safety share common bus
Scala	ble	Up to 65,535 addressable slaves per master
Drive	safety	Triggering Safety Functions in Drive over FSoE bus (e.g. STO, SLS, SLP, SOS, SS1, etc.)



Decentralized safety concept

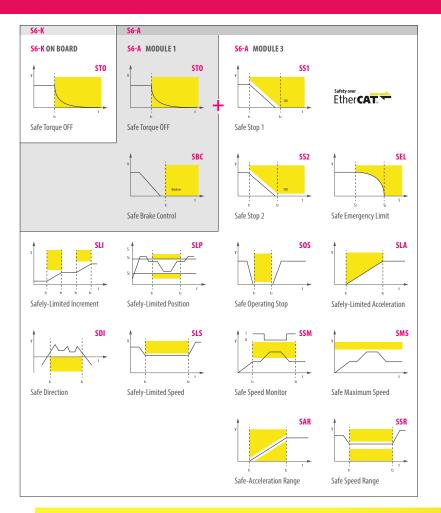


Functional safety (FS) drives



HIGHLIGHTS

- Scalable safety concept
- PL e (ISO13849-1) and SIL3 (IEC61508 and IEC 62061)
- Advanced safe motion functions according to IEC 61800-5-2
- Fail Safe over EtherCAT (FSoE) slave option
- OSSD outputs for detection of wire breakage, shorts, and other events
- Safe parameterization through COMBIVIS studio 6
- Dual channel ripple interface for cascading safety chain



Why use drive-based safety (safe motion)?

- Less wiring remove contactors and other traditional safety components
- Fast response offload safety handling from safety PLC to individual drives
- Faster power cycles Safe modes possible without removing high power to drive
- Increased productivity access machine in safe modes without shutting down completely
- Replace electromechanical wear components like contactors and relays
- Cost savings compared to traditional safety solution

CLUTCHES

Power-on friction clutch (0.5 ... 500Nm)



HIGHLIGHTS

- Backlash free
- Horizontal or vertical mount
- Pulley/sprocket output or shaft to shaft clutch
- Shaft or flange mounted
- Tooth clutch for 3x torque
- Encapsulated DC coil (rectifiers for AC input voltage available)
- Enclosed clutch/brake options

KEB power-on DC clutches provides the means to spin an output with your input. The clutch engages when power is applied to the electromagnetic coil and safely disconnects the two with no power.

The clutch is designed to be able to work for numerous types of applications. It can be flange or shaft mounted to engage/ disengage a pulley or shaft from the rotating input. If a pulley or sprocket is desired, the unit can either be prepped for it or supplied with a customer specific one already attached.



See How They Work





BRAKES

Single disc spring-set brake (5 ... 1,500Nm)



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HIGHLIGHTS

- Dynamic and holding applications possible
- Encapsulated DC coil (rectifiers for AC input voltage available)
- Redundant spring design
- Horizontal or vertical mount
- Mounting flange options
- Microswitch for engagement feedback (option)
- Dust protection ring, IP44 (option)
- Hand release (option)

KEB spring-applied DC brakes provide failsafe power-off brake engagement. The brakes are released when power is applied to the electromagnetic coil.

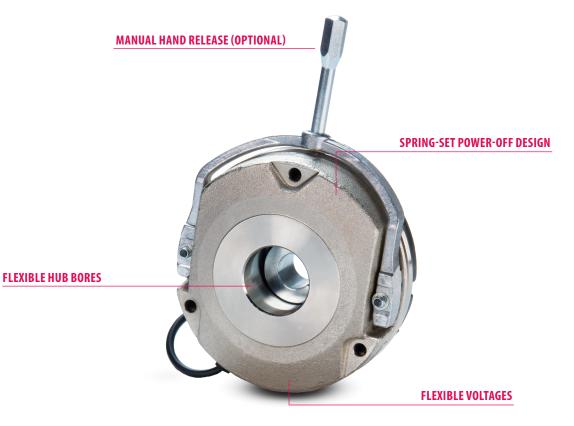
The spring-set brakes are designed to last even in the toughest applications. Each brake has multiple springs rated for 10+ million cycles. The brake operation is very basic – the only moving part is the armature. No linkages. No solenoids. No moving parts to wear and replace.

KEB's single disc spring-set brake comes in two versions. Version N is designed for dynamic applications with regular brake engagements at high speeds. Version H is designed for static (holding) applications with the capability to handle emergency stops.









GEARMOTORS

Integral gearmotors



HIGHLIGHTS

- Induction or servo motor (up to 60Hp)
- Inline and right angle solutions
- Compact design
- Large output torques
- Flexible options: brakes, encoders, mounting flanges

For more than 45 years KEB has been producing compact and efficient gearmotors for a wide range of industries. The gearmotors are German-engineered and assembled in the United States, so customers can expect a quality product with responsive application and service support.

KEB gearmotors are available with a wide variety of options. We offer helical worm, helical bevel, helical inline, or helical offset gear configurations. Our durable cast-iron housings can be given protective coatings for extra environmental protection for food-safe applications. Spring-set brakes can be added, like KEB's Type 38 which includes an optional hand release and microswitch, for power-off brake engagement. Customized outputs or feedback devices are also available.



BRAKE MOTORS

DC spring-set brakes and motor technology



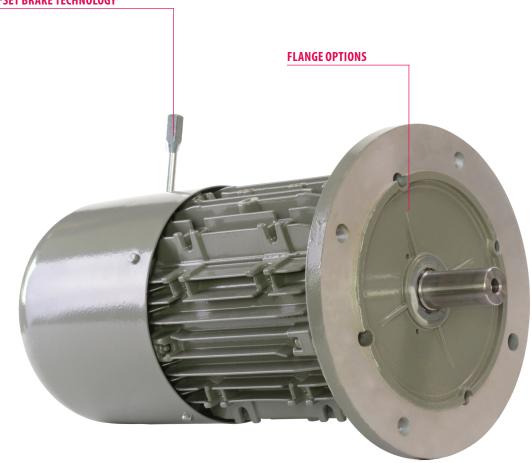
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HIGHLIGHTS

- Optional feedback devices available (TTL, HTL, Sin/Cos, Biss)
- Motors available with worldwide voltages in IE2 or IE3 efficiency levels
- Low inertia ideal for high-cycle applications
- Variety of flanges available
- IP54 protection is standard, with IP65 available for washdown applications

KEB's brake motors combine the latest motor technology with robust DC spring-set (spring-applied) brakes. The brakes at the heart of the brake motor can be customized with a number of different options including a manual hand release or noise reduced option. A variety of flanges are available, including NEMA C-Face flanges and IEC B5 and B14 flanged motors.

The low inertia motors are available with different worldwide voltages, so they can be incorporated into a wide range of existing applications. They are inverter-ready with class F insulation and can be equipped with feedback devices.



KEB SPRING-SET BRAKE TECHNOLOGY

LOW-INERTIA SERVO MOTORS

Dynamic line 3

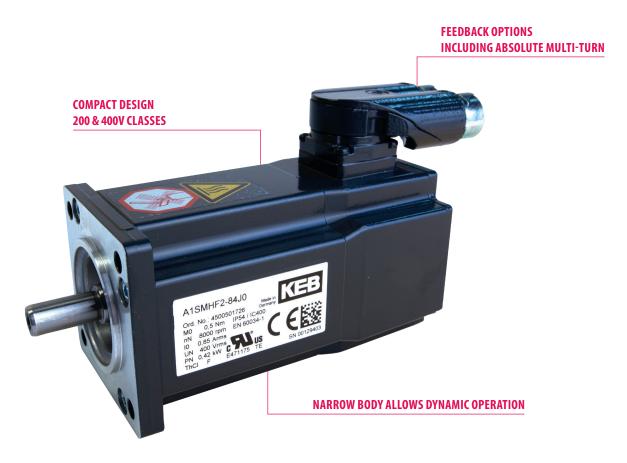


HIGHLIGHTS

- Powerful, compact design, up to 82Nm nominal torque
- Option with KEB P1 permanent magnet brakes
- Quick connect power and feedback connectors
- Encoder options including absolute formats like Hiperface and BiSS

For dynamic, high-speed control requiring positioning and cycling KEB offers a line of servo motors in a range of sizes. The DL3 series of motors has pivoting compact angle connectors and is easy to install in existing applications.

The DL3 series of motors is ideally matched with an S6 Servo Drive. Along with a range of planetary gearheads, KEB is able to offer a full solution for dynamic servo applications.



KEB

PLANETARY GEARHEADS

SERVOGEAR PP



HIGHLIGHTS

- High-quality, German-made gears
- Economy and precision (low backlash) options
- Inline, right-angle, hollow
- Hygienic options
- Lifetime lubricated

Economy and performance are the key features of the planetary gearboxes offered by KEB. The powerful gears generate minimal heat and have optimized output bearings designed for high radial and axial forces. The gears offer low backlash operation with the industry's highest torque density available. Mountings are flexible and easy to install, and lifetime lubrication means they are nearly maintenance-free.



DRIVES

Unique drive technology from KEB

Since 1985, KEB has been a leader in drive technology. From the first generation Combivert frequency inverter, to the high-powered 4-quadrant drive systems being designed by KEB engineers today, we have built a legacy of flexible, powerful products that can be used in a wide range of applications.

Flexible communication options

KEB drives were designed to be flexible. Whether you're building your installation from the ground up, or you need a drive to integrate with your current system you can be sure a KEB drive will be able to communicate with the rest of the line. EtherCAT, Profinet, Ethernet/IP, and Powerlink are just a few of the communication protocols supported by the drive interface. Additionally, since the communication operators are modular, the customer can choose which protocols are best for their installation and add or subtract as needed.

KEB drives can be paired with a fieldbus communications operator to provide easy support to an installation no matter which communication protocol the customer has selected. Operators can even be swapped out with no additional tools needed. We offer LCD, LED or Serial operators for use with our drives.



Single-axis positioning module

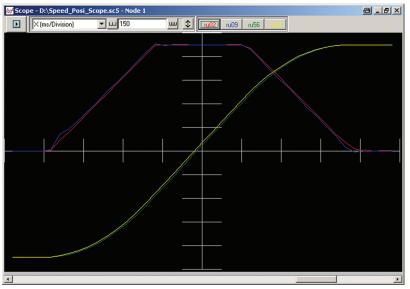
For applications that require positioning control over a single axis, KEB drives can provide a streamlined and cost-effect solution. Each closed loop KEB drive contains a 32bit position controller. Various homing routines are supported and relative and absolute positioning can be accomplished through an internal positioning table or via the communication bus.

SCL Positioning

KEB's proprietary Sensorless Closed Loop (or SCL[™]) technology <u>allows</u> <u>positioning without an encoder</u>. SCL has been succussfully implemented for metering, mixing, conveying and indexing applications.

SCL works by using a complex motor model and an internal calculated position. SCL can be used with both servo and induction motors and allows the motor encoder, feedback card, and cabling to be removed from the system.

The benefits are a reduction in total system costs and a better technical solution for washdown or vibration-prone environments.





DRIVES

F5-K inverter



HIGHLIGHTS

- Worldwide platform: 230 and 480V classes (up to 1000Hp)
- Internal 32-bit positioning control (single-axis motion)
- SIL3 Safe-Torque-Off (STO) safety option
- Integrated brake handling with Pre-Torque[™]
- Dual channel encoder card
- Supports 10+ communication protocols including EtherCAT

The safety-focused F5-K frequency inverters feature an internal positioning module which allows for easy coordinated positioning. One possible implementation is to have a master control simply provide a set position to the drive through the communication bus and the drive handles the position profile. The drive is capable of operating at 16kHz switching frequency with automatic derate.

KEB's drives feature dual encoder channels which can be configured as inputs or outputs. This makes evaluating the hoists speed feedback very easy. A sample implementation is to compare the motor feedback and speed feedback from the drum side of a winch. The KEB drive can continuously evaluate the two signals with an internal gearing ratio and determine if an e-stop is necessary.



DRIVES

S6 servo drive



HIGHLIGHTS

- Up to 5.5kW
- 200 ... 480VAC input
- Real-time communication: EtherCAT standard
- Narrow profile
- Safe Motion functions (page 9)

The compact S6 servo drive is ideal for high-performance servo applications that require real-time communication, SIL3 safety functionality, or integrated brake control. Like the F5 family of drives, the S6 is capable of assisting in complex control applications via EtherCAT or other Ethernet-based communication formats. The book-mount style housing means it only takes up a tiny amount of space in the control cabinet.



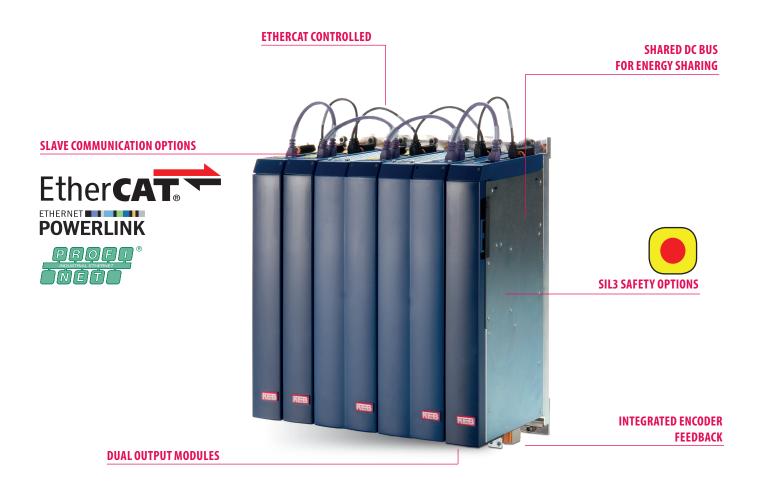
H6 multi-axis drive



HIGHLIGHTS

- Multi-axis drive platform (shared DC bus)
- Operates induction and servo motors
- High performance EtherCAT connected
- Dual output modules possible
- Integrated SIL3 safety functionality and encoder feedback

KEB's modular H6 drive system gives the user flexible control over multiple axes. A wide range of rated currents, cooling options, and safety modules allow the customer to build a drive system that works best for their installation. The drive can be configured as an EtherCAT master with pluggable fieldbus cards that support Profibus, CAN, Interbus, and Profinet. Drive modules are available in single or double axis outputs. Supply and PLC control units can be selected to best suit the application's requirements.



C6 Smart embedded control



HIGHLIGHTS

- Compact DIN rail IPC uses less cabinet space
- Dual Core ARM Cortex A9 processor
- 32-bit processor for synchronized motion and camming profiles
- Integrated EtherCAT E-bus for expandable I/O
- Integrated micro UPS for critical applications
- Remote maintenance features standard

An investment in automated packaging machinery brings expectations of increased efficiency, productivity, and reliability. This is only possible when the brain of the machine is powerful, robust, and flexible for the many demands of its control process.

The C6 SMART is the intelligent control choice to meet the demands of packaging machinery ranging from primary and secondary to end of line solutions. The C6 SMART is an extremely compact DIN rail IPC with dimensions of 47 x 122 x 124 for efficient use of cabinet space. Its powerful Dual Core ARM Cortex A9 processor guarantees short cycle times when executing complex motion and camming profiles. Real-time communication is the standard with an EtherCAT master and integrated EtherCAT e-bus with expandable I/O that allows for flexibility when changes to machinery requirements are necessary.





C6 Remote I/O

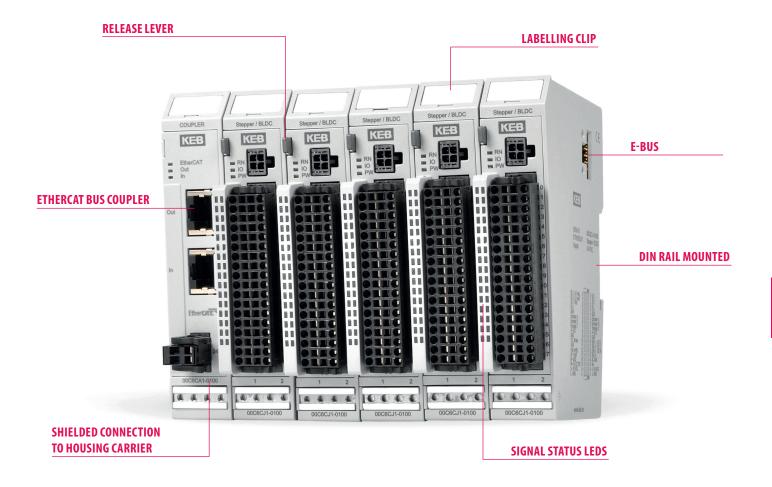


HIGHLIGHTS

- EtherCAT communication bus for real-time process communication
- Flexible and scalable
- Compact, DIN rail mount modules for reduced installation effort
- Large number of options and configurations possible

End users always have different requirements for their packaging processes. C6 EtherCAT remote I/O modules are scalable and flexible to meet the wide range of user needs.

C6 Remote I/O has many options to handle signal types in real time for precise, synchronized motion in an easy to install compact DIN rail mount form. Regardless of machine type, whether it be a filler, cartoner, packager, wrapper, or palletizer, C6 Remote I/O modules can adapt and scale to any control process.



Stepper module

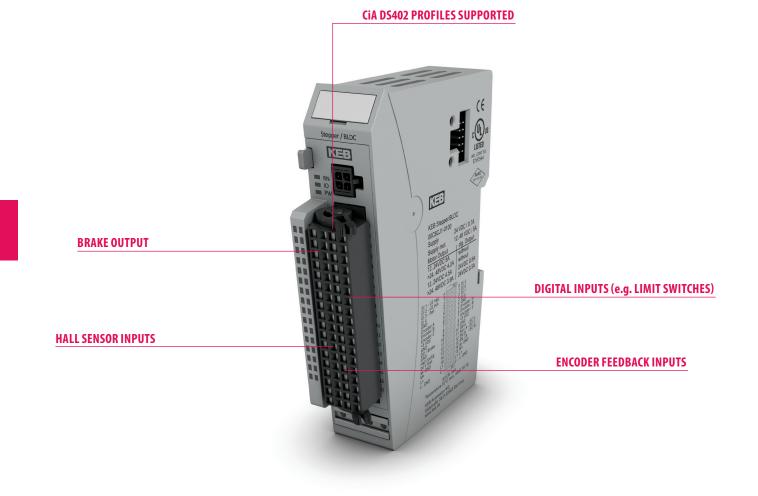


HIGHLIGHTS

- 12V ... 72VDC motor voltage (cUL rated up to 42VDC)
- Encoder and hall sensor inputs for closed loop control
- Compact and expandable
- CiA DS402 motion and homing modes
- Configurable I/O
- EtherCAT bus connected for easy installation; removable terminal strip

Used as a remote terminal, the C6 Stepper Module is designed to actuate a stepper or brushless DC motor with incremental encoder. It features five digital inputs to be used with limit stops, reference switch or similar signals. A digital output is also available for a holding brake or similar device. Like other KEB C6 devices it can be commissioned using COMBIVIS 6 studio software and libraries. KEB's Studio libraries contain function blocks for setting up the stepper module.

The drive module is compliant to the CiA 402 standard and allows the following drive modes: stepper motor (open or closed loop mode), brushless DC motor, profile position, velocity, profile velocity, profile torque, homing, and cyclic synchronous (position, velocity or torque mode). It also features auto setup mode, automatic brake control, I2T motor overload protection, and user-defined units of measurement. The module is cULus listed.





PROGRAMMING TOOLS

COMBIVIS studio 6



HIGHLIGHTS

- IEC 61131-3 application development
- Device and library database
- Product configuration
- Start-up and diagnosis assistant
- COMBIVIS studio HMI integration
- Document database

Engineering packaging machines that are reliable, efficient, and scalable require powerful and useful tools. COMBIVIS studio 6 guides the machine designer through the engineering process. From initial concept to maintenance, COMBIVIS studio 6 offers to increase engineering productivity and shorten the development time. The following tools can be used during specific design phases:

Initial concept

KEB's unique project configurator brings the concept to life with guided product selection and easy BOM output with technical specs and manuals provided in the document database. From the configurator a project configuration can be created including drives, PLC, remote I/O and HMI project setup. The configurator and built-in document database reduces time finding technical specs and configuring initial system design.

Design

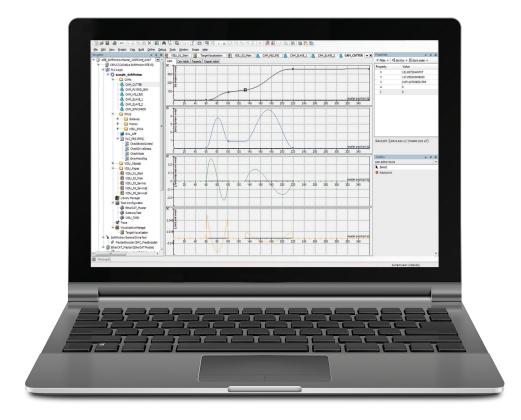
Programs are developed with IEC 61131-3 languages allowing open, reusable, and power object oriented programming. For further ease of use and reduced application development time an extensive library of drag-and-drop KEB and PLCopen function blocks can be used for specific motion control tasks.

Startup

A seamless startup is possible with built-in startup wizards and diagnosis assistants. For example, each drive can be tuned quickly using the drive startup wizard.

Remote maintenance

Once the machine is in the field, remote maintenance is possible with the integrated COMBIVIS Connect software. This feature saves time and money by resolving problems fast without the need of service trips.



HMI and panel IPCs

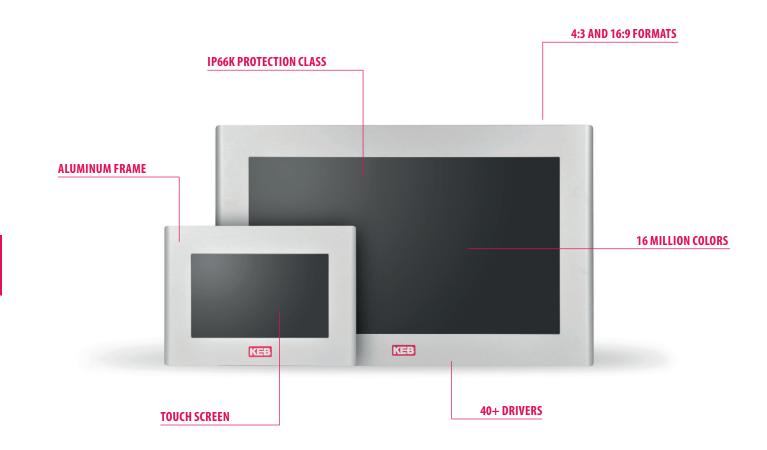


HIGHLIGHTS

- High-quality visualization system
- Flexible, open communication with multiple interfaces and drivers
- Integrated remote maintenance Industry 4.0
- Intelligent memory management with large internal memory
- IP66K front suitable for harsh environments
- 4.3" up to 24"

Manufacturing environments are constantly changing, and for that reason packaging machines must be usable by different operators. High quality HMIs with high functionality and durability is necessary for consistent product labor.

The C6 HMI boasts a stunning 16 million colors in a IP66K front bezel for use in harsh environments with resistive or capacitive touch options. Increased productivity beyond the plant floor is a necessity to harness the benefits of Industry 4.0. Many ports, a high amount of internal memory, and integrated remote maintenance allows for connectivity between the OT and IT world.





HMI PROGRAMMING TOOLS

COMBIVIS studio HMI



HIGHLIGHTS

- Open communications driver database
- Automated variable exchange
- Parallel development of HMI and controller projects
- Extensive template library
- High-level archiving possibilities

Combivis studio HMI is used for designing HMI screens. KEB has the philosophy that the HMI interface should be designed for flexibility, scalability, and connectivity.



TOOLBOX

HMI LC



HIGHLIGHTS

- All-in-one automation solution
- Controller with EtherCAT master
- High-quality visualization
- Integrated remote maintenance
- Micro UPS for protection of non-volatile data

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Packaging applications such as an indexer conveyor or a simple bag filler require a cost-effective solution. The C6 HMI LC is a flexible, affordable tool that combines HMI visualization with logic control in one unit.

A A O U

The C6 HMI LC includes an EtherCAT master for control and high quality visualization in sizes ranging from 4.3" to 15.5". To further reduce costs and harness the benefits of Industry 4.0, integrated remote maintenance is built in as standard.



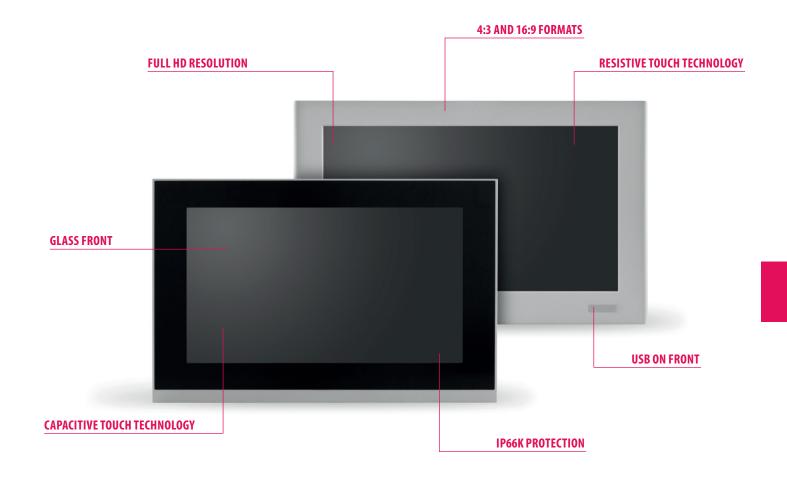
Industrial PCs



HIGHLIGHTS

- Fanless panel or IPC box up to 50° C operating temperature
 Intel® Bay Trail Platform with 64 bit architecture
- LED backlight TFT LCD display with 16 million colors in range of formats
- Slim version available for installations with limited space
- Smart memory concept for maximum flexibility in application

Applications such as pick and place robots with high dynamics and position accuracy require high computing performance. KEB can handle these applications with its powerful line of reliable IPCs. The C6 P30 for example, uses the powerful Intel Ivy Intel Bridge platform with multi-core technology. With KEB higher computing power does not correlate with higher space requirements and noisy fans. Slim and fanless IPC offerings are perfect for installations with limited space.





• Optional HMI functionality for data logging, diagnostics, and notifications

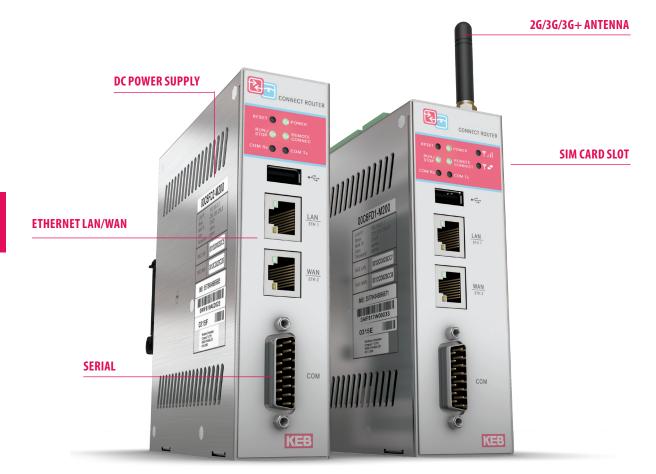
Reduce field visits and travel costs with KEB's VPN Route. Connect to any PLC on your network <u>securely</u> for Remote Access. Optional HMI functionality allows for data logging, trending, and remote alarm management.

Our C6 Router comes in four versions to best suit your installation. With or without HMI functionality, with or without the ability to connect via a GSM cellular modem.

The C6 Router is the ultimate service and support tool for your packaging machine.



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COMBIVIS Connect

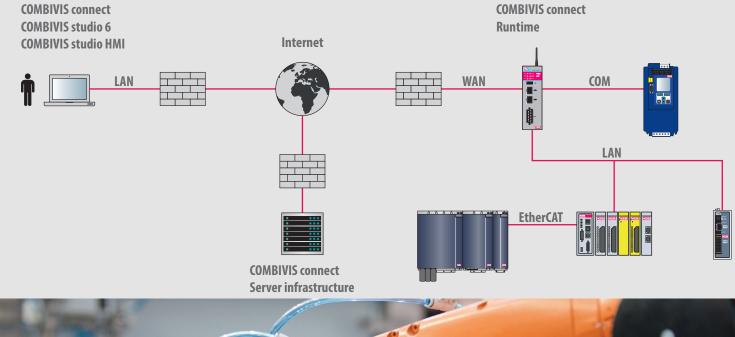


HIGHLIGHTS

- Remote management of KEB devices
- Programming, maintenance, and updating of projects
- Secure VPN connection between the operator PC and the remote device
 - Activates safety processes with end-to-end sessions without intermediary
- · Redundant distributed server architecture guarantees reliability and stability

COMBIVIS Connect secure remote maintenance platform ensures optimum service conditions in a modern automation system. Via secure end-to-end connections, centrally managed devices are easily available at any time - without costly travel between locations. Regular data recording ensures accurate reporting of machine data to give users the best possible analysis of the automation process.

Combivis Connect is certified according to the industrial communication network security standards IEC 62443. This certification was awarded due to the successful audit carried out by the independent organization ProtectEM.







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