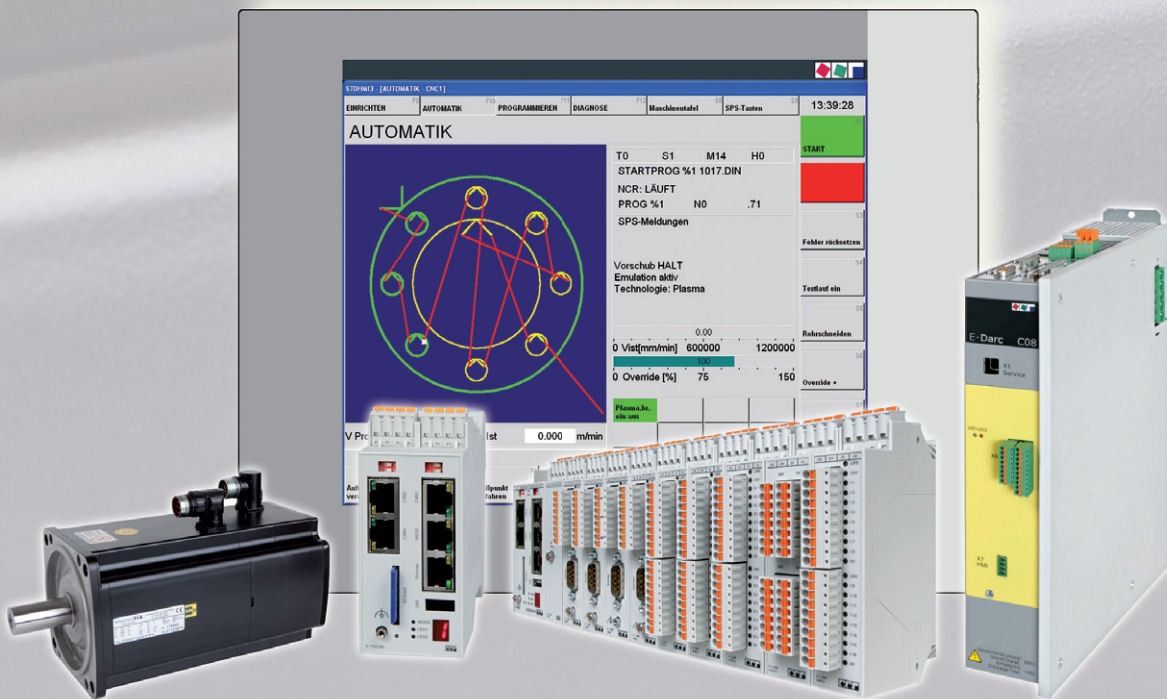




ECKELMANN

## Machine control



Source of inspiration



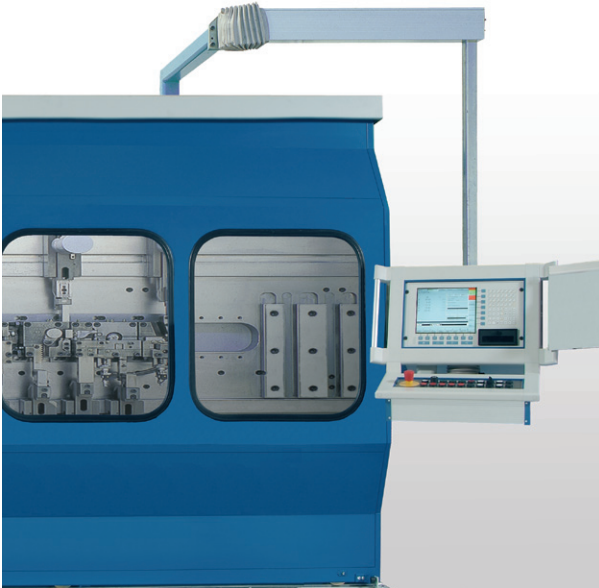
## We create automation

### Machine Control on the Road to Success

Eckelmann AG and Ferrocontrol Steuerungssysteme GmbH & Co. KG are medium-sized partners in control for innovative manufacturers of machinery. As suppliers for all ranges of machine automation we offer partnership in technology on an equal footing: the customers take advantage of short decision-making processes and of direct access to the R&D departments.

The range of solutions is based on standard components in the field of drive, CNC, PLC and motion control. If required, these solutions are adapted to the respective application and technology.

As a result, we reach technically and economically perfect solutions which guarantee the customers' machines a lasting competitive edge.



### If Standard is not Enough

Thanks to principles of central design, we are on the road to success with our customers for more than 35 years:

- **Coordinated solutions from a single source**

Eckelmann covers the entire range of machine automation, from the motor to the user interface. Homogenous solutions are the result. Due to a particularly wide range of in-depth solutions, Eckelmann is able to reduce the workload of its customers by the overall responsible management of automation projects.

- **As much standard as possible and reasonable**

Our solutions are based on proven and economical standard components. The last bit of function and price optimization which is decisive for winning the competition is made by the target-oriented adaptation in hardware and software development.

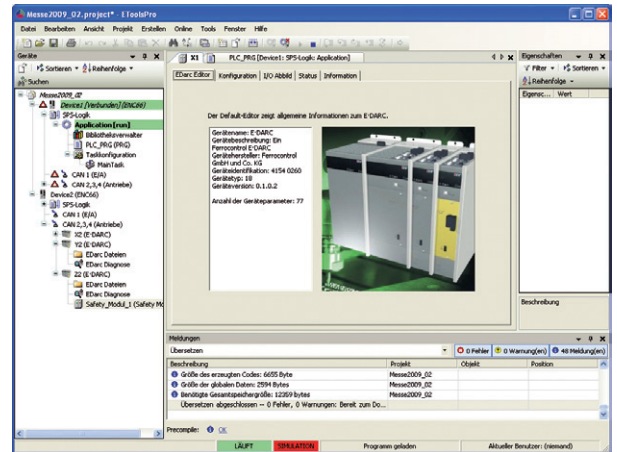


## E°Tools: One Interface for Everything

### Keeping a Grip on Everything: E°Tools PRO

With the software E°Tools PRO Eckelmann offers a cross-system tool which assists the customers during project planning, configuration, programming and parameterizing of his automation solution and supports him quickly and purposefully in service cases.

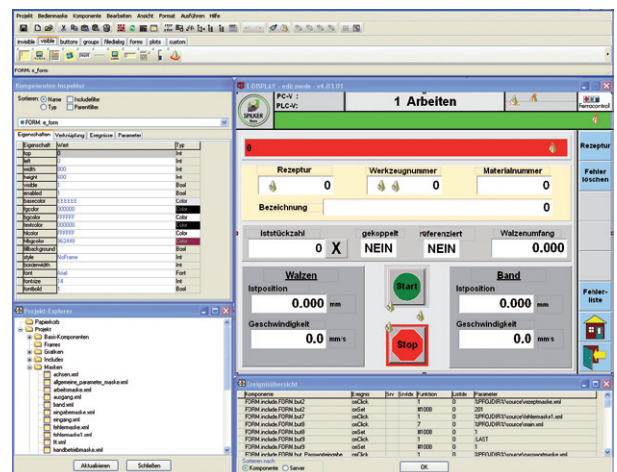
With this „single point of engineering“, Eckelmann offers considerable freedom and independence to the customers in terms of design and improvement of the machine control. This is the way it should be. Eckelmann wants to stand out for flexibility and openness of its systems without limiting the customers' room to make decision by proprietary solutions.



### Keeping Everything in View: E°Tools VIS

The software E°Tools VIS is a modular, high-performance visualization system which makes quick and simple setting of complex user interfaces possible.

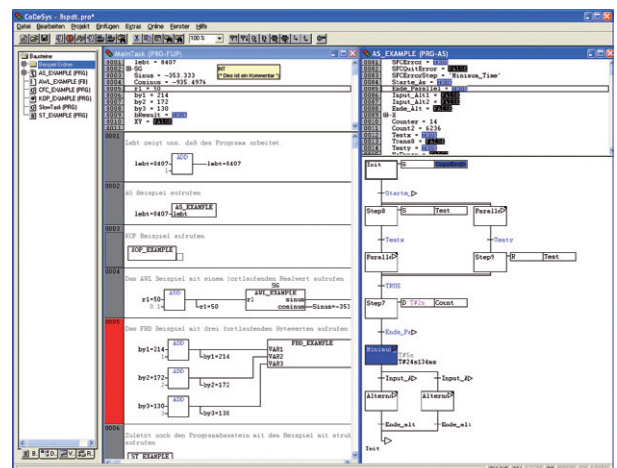
With this tool, the mechanical engineer is able to design the user interface by himself, without considerable initial training expenditure, or to influence it at his will. In this way, experience in mechanical engineering and up-to-date software design can come together. The result is an ergonomic visualization which optimally considers the needs of the operator.



### Keeping Everything under Control: E°Tools PLC

The proven development system CoDeSys® for control applications which is in compliance with IEC 61131-3 is the basis for PLC programming (with FBD, LD, SFC, IL and ST). CoDeSys® guarantees high stability and safety in application. Additional advantages are:

- Quick adaptation due to easy configuration
- Thoroughly developed functions
- Flexible use of standardized function applets
- User-defined data types
- Large-scale online functions





## Industrial PC and Terminals

### Programmed for Success: FIPC

Our industrial PC of FIPC series meet high requirements with regard to robustness and life, due to their design suited for industrial application. Size, power and equipment variants may be selected individually from a wide range of options and precisely fitting solutions may be configured.

#### Sustainable design and service

The units of FIPC series cover a wide range of performance, from the simple operating function to the complex data base application.

For all FIPC, ECKELMANN guarantees a continuous series of products as well as a lasting service concept on the basis of long availability of spare parts.

#### The right option for your application

All IPC can be installed space-optimized in racks, control cabinets, control panels or swing frames.

The robust TFT and touchscreen displays are available in different sizes. Remote operation of the component is possible at a distance of more than 30 m.

All FIPC can be equipped with customized accessories, such as integrated UPS or accumulator pack.



### One Size Smaller: Terminals

Eckelmann terminals with TFT displays and touchscreens are available for smaller machines or for operator panels or displays with reduced graphical demands.

Degree of protection, processor capacity, memory, size of display, interfaces or operating system may be selected in compliance with the customers' application. User interfaces of different complexity are generated quickly and user-friendly by means of the visualization program E°TOOLS VIS.





## Machine Safety

### Certified Safety

The EC Directive relating to machinery as well as the standards EN ISO 13849-1 and EN IEC 62061 require increased measures to be taken by the machine manufacturers in order to protect men and the machine. The integration of safety functions in compliance with the Safety Integrity Levels (SIL) is, therefore, integral part of the Eckelmann range of solutions.

#### E°SLC 204

The Safety Logic Controller E°Control SLC204 is a programmable safety controller. These requirements can be met easier with the E°SLC 204 than with the traditional hardware-based and wired logic. Particularly in mechanical engineering of series, less wiring means also less testing expenditure in manufacturing and thus less overall costs.

Programming of the E°SLC 204 is made by means of the function block diagram known to electrical designers and PLC programmers. Universal Boolean operators, flip-flops and time relays are made available, but also specialized blocks for emergency stop relays, guard door monitoring, grid-type light barriers and two-hand control devices.



#### E°Darc Safety Controller Modul SCM

A complete locking of state-of-the-art machines is often not sufficient in case of open guards. For an effective operation, machines need to be moved with open guards in order to carry out setting and maintenance work. In these cases, only limited speeds or controlled paths are allowed to safeguard the operators' safety.

By means of the parameterizable safety controller module SCM, this task can be solved very smoothly together with the E°Darc drives and in particular without additional angle encoders. As soon as the SCM recognizes an inadmissible motion, the entire machine is immediately set to safe condition.





## Controller

### E°EXC 55: The Basic Controller



As a standard, this basic version offers a wide range of interfaces such as Ethernet TCP/IP, 2 x RS-232 as well as 2 x CANopen® for direct connection of field bus terminals and drive controllers.

After being equipped with the following software libraries, the E°EXC 55 becomes a compact, integrated package solution:

- ENC (CNC) with NC operating system, standard HMI for PC and DIN programming for up to 12 axes
- ELC (PLC) with the programming tool E°Tools PLC
- EMC (motion) with additional motion library as per PLCopen for up to 64 axes

### E°EXC 66: The High-End-Controller



The E°EXC 66 is the standard controller for CNC applications, PLC and motion applications in the higher performance level. The technical highlights are:

- Highly efficient 32bit microcontroller with minimum energy consumption
- Extension of memory capacity by means of SD-card
- 4 x CANopen®, USB, RS-232
- Real time Ethernet (sercos III, EtherCAT®)

### E°EXC 66 compact: The Compact Controller



Due to the high extent of functions and interfaces, this controller with low space requirements (W 45 x H 100 x D 115 mm) offers an optimized price/performance ratio for smaller and medium PLC applications.

- 2 CAN bus interfaces, Ethernet interface and serial interface (RS-232)
- Extension of memory capacity by means of USB port
- Equipment with software library for PLC operation, programming as per IEC 61131-3

## I/O-Modules: FBM, LBM, XBM

### CANopen® Field Bus Modules FBM: Quick Response due to Intrinsic Intelligence

E°FBM series offers a need-based selection of digital and analog input and output modules as well as of more complex function modules, e.g. the positioning module or the CAN-dongle.

All E°FBM are equipped with the intelligence of an intrinsic 8 bit controller. This increases the speed of reaction by the factor 4-20 when compared with other field bus based controllers and reduces the workload of the CAN-bus.



### Local Bus Modules LBM: Compact and Bus-Synchronous

E°LBM series offers encoders modules / axis interface modules, digital and analog input and output modules in particularly compact design which meet the requirements of very time-critical applications. The local bus guarantees the synchronicity of the modules in the interpolation cycle of motion control which is important for many machine applications.

Like E°FBM series, also the local bus modules are intended to be used with the embedded controllers E°EXC 55, E°EXC 66 and E°EXC 66 compact.



### Field Bus Modules XBM: Quick, Robust and Ethernet-Capable in Real Time

This latest generation of future-oriented field bus modules stands out for exceptional flexibility and for highly useful, simple handling. Its robust EMC-safe and compact design opens a particularly wide range of applications in connection with the E°EXC 66 and future controller generations.

All E°XBM may be integrated synchronously into the Ethernet field bus networks (sercos III and EtherCAT®). Even extensive applications may be designed for shortest bus cycles with a delay of only 1 µs per activated module.





## Drive Controllers: E°Darc C

### E°Darc C: High-End Servo Controller

It is the innovative design in FPGA technology that makes the servo controllers of E°Darc series the absolute trendsetters in the power range between 2 kW and 16 kW. This technology makes it possible to parallelly process current controllers, speed and position controllers, and sets new standards for control quality and speed.

The end user draws immediate profit from this controller by a considerable increase of both the productivity and the product quality due to smooth running and accuracy.

#### **OMCP: The key to integration of customer applications**

Thanks to the open motion controller platform (OMCP), customer-developed MATLAB-Simulink algorithms can be integrated into the controller software of the E°Darc without additional programming expenditure.

#### **RePower: The module for energy efficiency**

The E°Darc can be equipped with the RePower module, as an alternative to the well-dimensioned power supply units which are equipped with an internal energy recovery function. Due to the recovery of brake energy to the local supply network, this module causes a clear and distinct increase in energy efficacy.

#### **Rapid communication „plug&play“**

The required field bus standard is available for the E°Darc with the comfortable plug-in of option cards: CANopen®, sercos III or EtherCAT®. A wide range of encoder interfaces is offered which may be used flexibly by the controller.

#### **E°Darc C DUO: The „2in1“ controller**

With the E°Darc DUO, Eckelmann offers a controller option with two power stages in the same housing, if costs and space requirements are the decisive feature. The limitations on the encoder interface module, on the controller cycle as well as on the safety functions do not play a decisive role in many applications.





## Drive Controllers and Motors

### E°Darc V: The Controller for all Cases

Model E°Darc V offers the optimally adapted solution for medium power ranges between 500 W and 2 kW. This drive controller has a 230 V / 400 V power supply and is suited for all AC drives. Via its CANopen® DS402 interface, the controller communicates with all controllers of the E°EXC series.



### E°Darc M: The Controller for Small Power Ranges

For applications with small power ranges between 200 W and 800 W, the E°Darc M is available with a DC power supply of 10 V to 60 V. Due to its particularly small housing dimensions, this compact drive controller is suited for top hat rail mounting and controls the BLDC and DC motors.

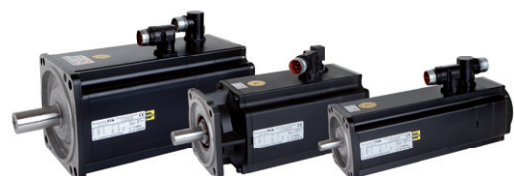
The controller has a CANopen® field bus interface (device profile DSP402, DS301 protocol), an encoder interface, an analog input and four digital inputs and a digital output. It can be used in PLC applications and is suited for motion control / path interpolation via CANopen®.



### E°Motors: Efficient Motion

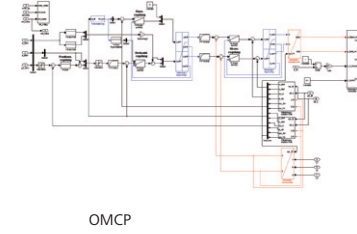
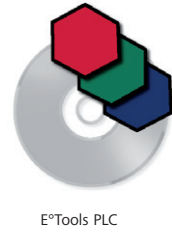
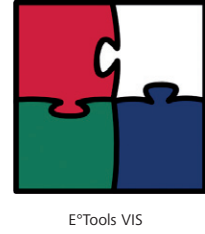
The diversified E°Motor program makes the selection of a motor type possible which precisely meets the mechanical requirements with regard to its characteristics, speed, torque, motor output and design. Compact motors make a decisive contribution to an optimum energy recovery and J-motors are suited for particularly dynamic applications.

A wide range is available of synchronous motors, asynchronous motors, linear motors and torque motors.

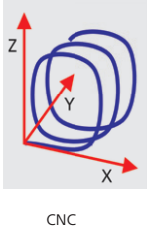
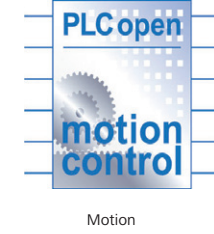


Tools

Software

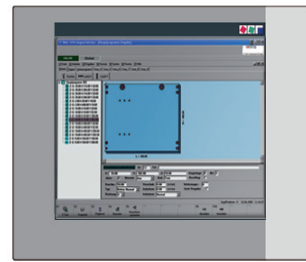
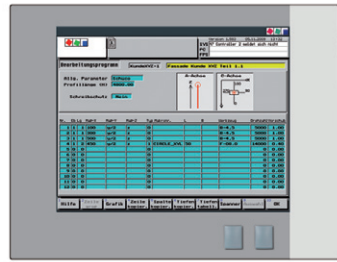


Firmware



Panel-IPC

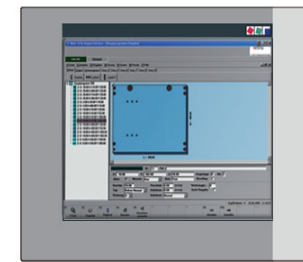
Industrial PC,  
Panels and  
Terminals



Box-IPC



Extended Industrial Panels



Industrial Terminals



Controller

Embedded  
Control



Safety



Field Bus Modules (FBM)



I/O Modules



Local Bus Modules (LBM)



Field Bus Modules (XBM)

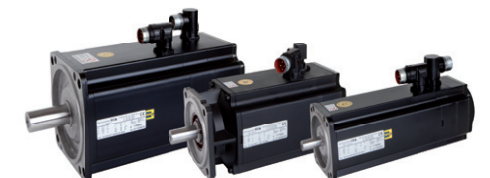


E°Darc

Drive  
Technology



Motors





## PLC Solutions

### PLC in perfect fit

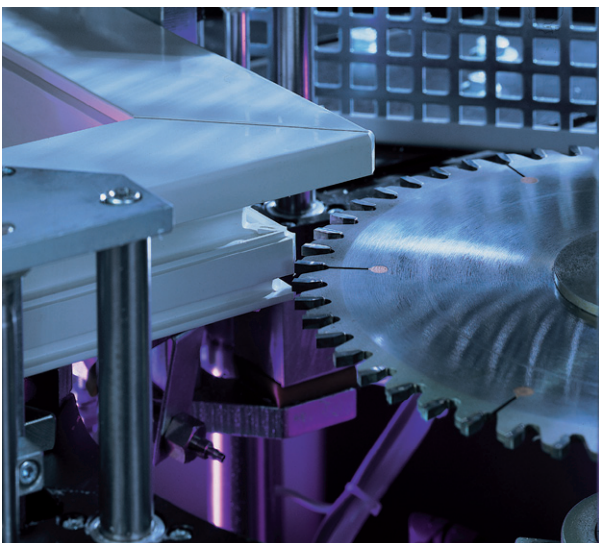
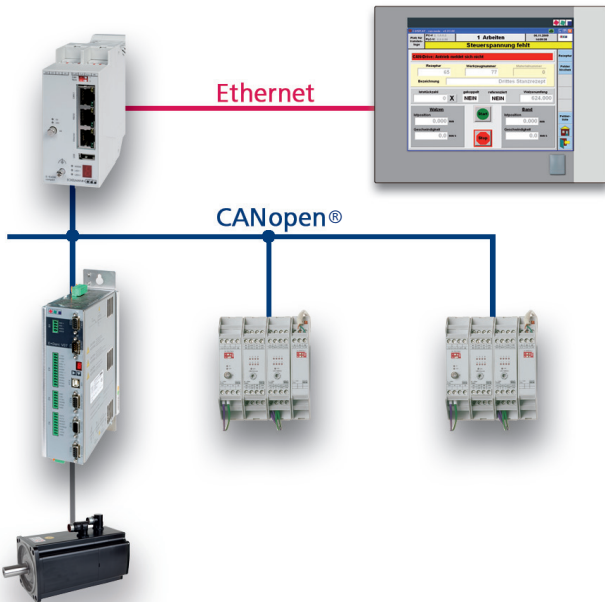
The Eckelmann hardware and software tool box already includes the PLC integrated package solution for all common tasks of machine control. Every application can be fitted from the wide range of components. According to the motto „As many as necessary as little as possible“, controllers, drives and motors, terminals and I/O modules are selected which meet the demands and may be combined without problems. Extensive and proven function libraries make the application development easier.

The integrated package solutions of Eckelmann are able to grow, if required. Once developed, the application software can be ported flexibly to new hardware configurations. In this way, each machine solution remains flexible and R&D costs and time are saved.

### Examples of Application

Eckelmann's PLC solutions are used both as integral part of motion control and CNC applications and as stand-alone systems. There is a great variety of target markets, from packaging industry and intralogistics to the medical equipment industry.

The actual PLC functionality can be further extended by additional technologies provided by Eckelmann. An example is the intralogistics package solution for transport and the chaotic storage.





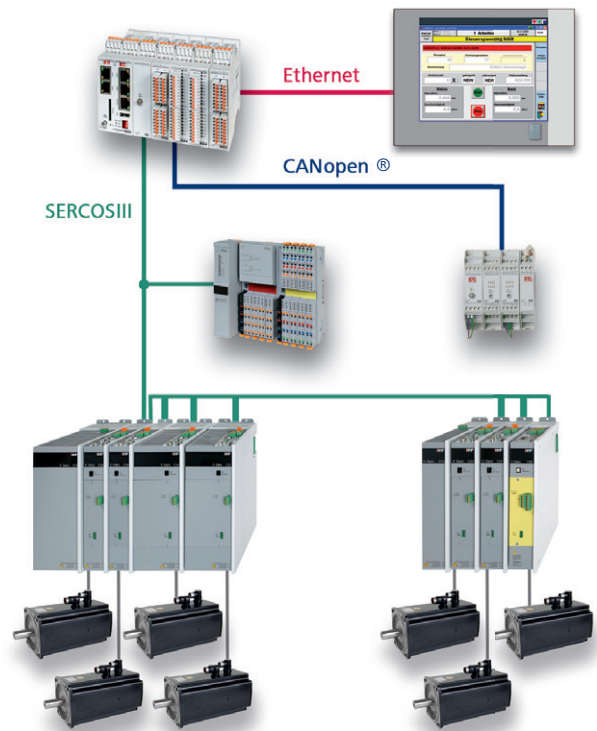
## Motion Control Solutions

### Motion on all axes

Many machines and systems require the coordinate motion of several servoaxes. Mechanical systems used up to now, such as the traditional mainshaft, gear and cam plates, are replaced by reliable, economical and flexible mechatronic solutions.

The Eckelmann controllers of E°EXC series are transformed to complete motion control systems by means of the MC software library. Their capacity (up to 64 axes), the selection of interfaces and the size can be scaled in compliance with the individual machine task.

The programming of the motion sequences with the proven CoDeSys® tool is made by means of the function library certified as per PLCopen standard. In this way, the long-term R&D experience of Eckelmann can be activated quickly and safely for new applications in the control of coordinated axes motions.

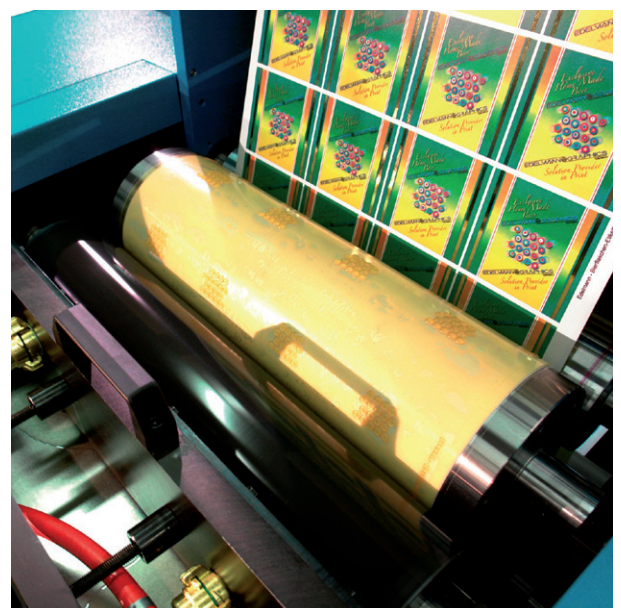


### Examples of Application

Customers of Ferrocontrol and Eckelmann make use of motion control solutions in various fields, such as

- Rotary punching
- Sewing machines
- Wafer handling

Most demanding solutions were found, for instance, for a long-term customer who operates in the field of job printing. The shaftless printing machines of this customer set the standards in printing industry and are based on the E°EXC66 and the MC software library.

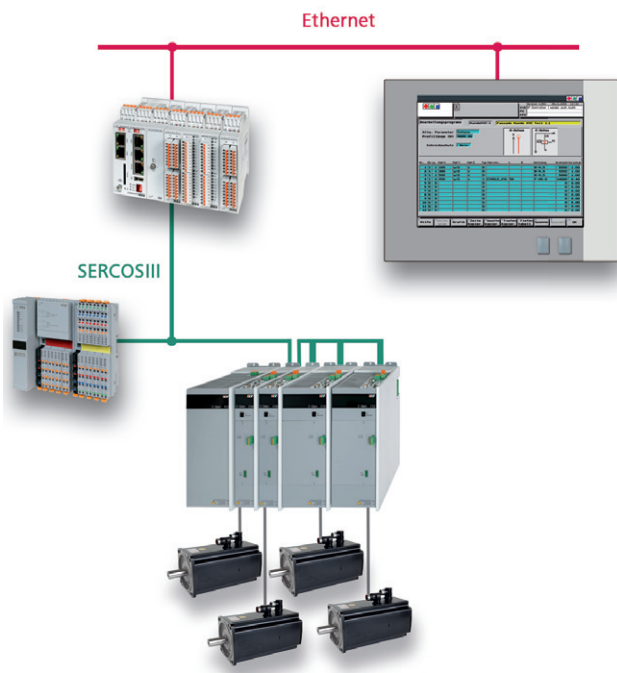






## CNC Solutions

### Empirically Good: CNC Integrated Package Solutions



On the basis of DIN 66025, the Eckelmann CNC software library contains a wide range of functions which was consequently increased in decades of experience. The integration of typical technological and geometrical requirements opens the way to many applications.

Eckelmann controllers equipped with the CNC package also support most demanding, multi-channel CNC applications with a total of up to 12 axes and cycle times of < 1 msec. The PLC functions are already integrated. The wide range of local interfaces meets all requirements for a connection of I/O modules and drives.

The engineers of Eckelmann AG support their customers in the technology-specific design of user interfaces and control units. In this way, proven functionality is combined with user-friendly design.

### Examples of Application

For more than 30 years, numerous machine manufacturers and users have confidence in the proven abilities of Eckelmann CNC and these customers represent the most different fields of application (grinding, cutting, handling, profile processing, forming, etc.).

Eckelmann offers the carefree package „CNC for cutting“ as latest solution for these industries. Both the respective HMI module and the NC and PLC operating system offer numerous functions which are adapted to the typical requirements of cutting with the most different cutting tools.



## OEM Solutions

### As You Like It: The Customized Adaption of Solution

Eckelmann and Ferrocontrol are partners in finding solutions for mechanical engineering tasks. We make available a wide portfolio of proven drive and control technology for the optimization of your machine control systems. If it is required by functionality and ergonomics and if it is economically imperative, available components are, however, modified and further developed in compliance with the demand.

Own development and manufacturing capacities make it possible to offer customer-optimized variants, in which for instance the installation size or keyboards and control panels are modified to the specific need of the user. Customized development of I/O modules are also part of the concept of user individualization.

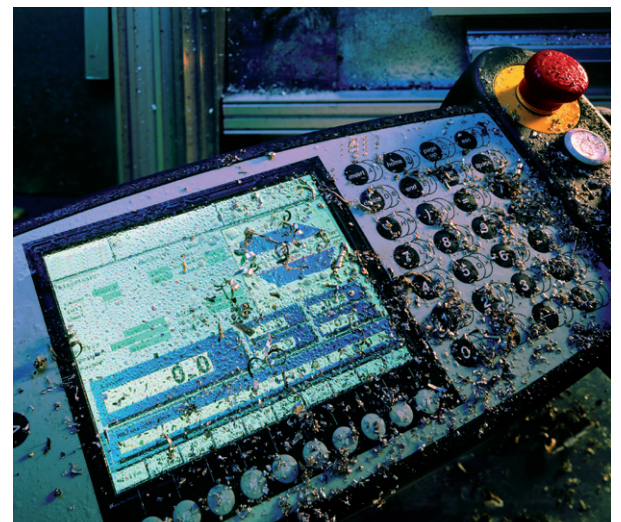
On the software side, this concept is supported by need-based extensions, e.g. of the NC functionality and/or the technological libraries or the HMI.

As many standard solutions as possible, this goes without saying, but as many user-individual adapting as wanted and reasonable. That is what Eckelmann and Ferrocontrol Steuerungssysteme mean by development of customized machine control.



## Examples of Application

- Customized field bus modules for machines of further processing in the printing industry
- Control components and I/O components with customer label
- Operator solutions with the individual „look and feel“ of the customer
- Technology-specific integration of software functions via the open-motion-controller platform
- Technology-specific and also exclusive CNC functions





## Eckelmann and Ferrocontrol – Partners in Mechanical Engineering

Eckelmann AG, Wiesbaden and Ferrocontrol Steuerungssysteme GmbH & Co. KG, Herford are medium-sized partners in automation for the manufacturing of machinery and systems. For more than 35 years, both companies have focused on R&D and implementation of automation solutions tailored to meet the individual function requirements and the environmental conditions of machines and systems. Within the framework of the Eckelmann Group, Eckelmann AG, Ferrocontrol Steuerungssysteme GmbH & Co. KG and Eckelmann s.r.o. in Tvrdonice (Czech Republic) work closely together in R&D and in sales.

The spectrum of solutions ranges from compact device control to the overall automation of big industrial systems. Important target sectors are: mechanical engineering, textiles and machine tools, printing and paper, electronics, metallurgy, chemicals and pharmaceuticals, industrial / commercial refrigeration, raw materials and construction materials, medical equipment, food stuffs and fodder.

The value proposition of Eckelmann is clear: „We manage the integration process from the automation component to the custom automation solution – with a price/performance ratio which guarantees the customer’s machine or system a lasting competitive edge.“

### Hardware and Software Solutions for all Levels of Electric Machine Automation

- Industrial PC: Panel-IPC, box-IPC, terminals
- Controller technology: Embedded controller, PLC, customized controllers, field bus modules
- Controller software: CNC, motion control, machine HMI
- Drive technology: Digital drive controllers, servomotors
- Image-processing systems: System integration and software
- Complete automation and control systems: Application packages of PLC and visualization, PC-based automation, multi-processor systems, production control systems, system integration

### Certifications

- DIN EN ISO 9001:2008
- EN ISO 13485:2003 + AC:2009, as a supplier for development and production of medical products
- UL-listed control cabinet manufacturer as per UL-File E233027



Eckelmann AG, Wiesbaden

### Eckelmann Group – Source of inspiration

#### ECKELMANN

Eckelmann AG  
Berliner Strasse 161  
65205 Wiesbaden  
Germany  
Telefon +49 611 7103-0  
Fax +49 611 7103-133  
info@eckelmann.de  
www.eckelmann.de

#### ECKELMANN s.r.o.

Eckelmann s.r.o.  
Růžová 17  
69153 Tvrdonice  
Česká republika  
Tel +420 519 323755  
Fax +420 519 323757  
info@eckelmann.cz  
www.eckelmann.cz

#### Ferrocontrol

Ferrocontrol Steuerungssysteme  
GmbH & Co. KG  
Bodenschwinghstrasse 20  
32049 Herford  
Germany  
Telefon +49 5221 966-0  
Fax +49 5221 66347  
info@ferrocontrol.de  
www.ferrocontrol.de