



ECKELMANN

## E°Product Overview

Let us help you **control the success of your machine!**





## Your **control partner**

We are your medium-sized control partner for innovative mechanical engineering. As a full-service provider for all aspects of machine automation, we offer technology partnership at eye level: Our customers benefit from short decision-making processes and direct support from our development departments.

Our range of solutions is based on standard components for drive, CNC, PLC and Motion - control tasks. Our solutions are adapted to application and technology specific requirements as necessary.

This results in technically and economically perfectly fine tuned solutions that give our customers' machines a sustainable competitive edge.

## Focussing on the **solution**

The range of components is not everything. At least as important is our application knowledge and the ability to create a complete requirement and application oriented solution from existing hardware and software components. Benefit from our years of experience in many application areas and let us help you find the ideal solution for you.

As product house and solution provider with in-house software and hardware development, we offer the best prerequisites for implementing even the most creative ideas and designs – starting from engineering through to commissioning and service.

## **Know-how**

For more than 40 Years, we have been further developing our control technology to actual requirements. Thanks to our own CNC core and in-depth knowledge, we are able to very quickly implement any idea successfully.

### Always **up-to-date**

**E°EDP** – the Engineering Documentation Platform

- Datasheets, manuals, software, technical know-how accessible from everywhere
- Document service call outs: Use E°EDP as log book for your machine.





## Application

Our highly-experienced application team is happy to assist you at any time. If desired, we support you with the creation of your personal solution, carry out adaptations and if required deliver complete solutions as well.

## Training courses

We offer training courses for all relevant subject areas. Duration and content of the training course will be tailored to the requirements and current know-how of the customer. The training will relate directly to the customer project.

## Customer service

Should you have any problems, our customer service will attend to your concerns or direct you to the relevant department. Subsequently, you will be informed automatically about the status of your enquiry. Alternatively you can check your support ticket at any time.

## Switch cabinet construction

As UL-certified switch cabinet manufacturer, we plan and specify upon request the complete electrical equipment of your machine. We offer maximum quality, flexibility and years of experience. We manufacture and perform tests in accordance with national and international guidelines and standards (DIN VDE EN 60204, ISO 9001:2015).

## Commissioning

Using the extensive documentation from Eckelmann, you are able to commission the machine yourself without any problems. If desired, we are happy to perform the commissioning on site. To ensure a quick commissioning, we prepare, whenever possible, any modifications in advance at our premises.

## Your benefits at a glance

- Peace of mind thanks to single-source solutions
- Broad range of applications thanks to the combination of PLC, Motion and CNC in one feature-rich device
- Eckelmann's own CNC and Motion core allows for flexible adjustment
- Operating reliability thanks to independence of standard operating systems in real-time
- Reliable hardware in compact design with minimal power consumption and high interference immunity
- Long-term availability
- Technology specific standard solutions in selected application areas
- Customer specific adjustments, development and production



## Controllers for CNC, PLC and Motion Control

The DIN rail controllers from the E°EXC control system family form the ideal basis for PLC, Motion and CNC solutions. Thanks to its consistent further development, the CNC by Eckelmann offers one of the most comprehensive instruction sets on the market and is employed in many industries. The CNC core contains a large variety of technology specific functions. This way sophisticated applications can easily be created.

### Highlights of the E°EXC family

- Extensive CNC instruction set
- Own CNC core as per DIN 66025
- Protected implementable, customer specific functions
- Comprehensive own PLCopen® Motion library
- PLC programming as per IEC 61131-3 (CODESYS V2 or V3)
- Symbolic DIN programming for more flexibility and transparency during project conception
- Extremely short cycle times
- Modern development and commissioning tools
- Plug & Play integration of components
- Flexible and application-oriented I/O systems
- Communication: EtherCAT®, CANopen®
- Webserver integrated
- Extremely compact and space saving
- Robust components with long availability
- Downward compatible
- Low power consumption

### E°EXC 66: Tried and tested

- 16 CNC axes and 60 Motion axes
- I/O system LBM
- Programming with E°Tools PLC (CODESYS V2)
- Real-time Ethernet (EtherCAT®)
- 4 CANopen® interfaces
- Memory expansion with SD card
- Export variant available (no BAFA export licence required)
- E°EXC 66 compact, the cost optimised compact variant



### E°EXC 89: The future-proof one

- Embedded controller up to 32 CNC and 64 Motion axes (combinable)
- PLC programming with CODESYS V3
- OPC UA server for Industry 4.0 connectivity
- Drive und I/O interfaces via EtherCAT® and CANopen®
- Stackable fast E°UBM E/A-Module, also available for distributed operation
- Interface for safety controller, slot for SD card and USB interface

## E°EXC 880: Made-to-measure



- Compact all-in-one solution
- Usable as PLC, Motion or CNC
- Specific expansion option through optional additional board
- Export version
- 4 interpolating axes
- Digital and analogue I/O
- 3 serial interfaces
- 2 x CAN, 1 x EtherCAT®

## E°UBM fieldbus modules: Quick, robust and real-time Ethernet-ready

The new generation of fieldbus modules convinces with a broad range of modules and easy practical handling. Its robust EMC proof and compact design allows for a particularly broad range of applications when combined with E°EXC 89 and future controller generations.

The I/O system facilitates clock-synchronised integration in Ethernet-based fieldbuses EtherCAT® or other fieldbuses (CANopen®). Robust with easy wiring thanks to a practical Push-In technology.

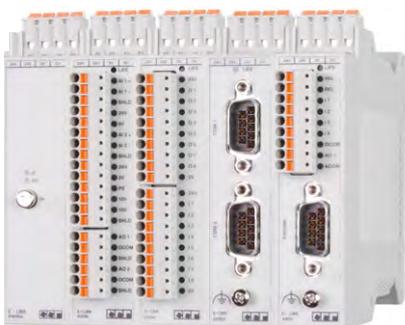
- Interference-free operation
- Ideal for terminal boxes with low overall height
- Bus couplers for various fieldbus systems available



## E°LBM Local bus modules: Tightly fitted and bus synchronised

For particularly time-critical applications, the encoder and axis interface modules of the LBM range offer digital and analogue I/O modules in an extremely compact design. The local bus ensures that the modules are synchronous at the interpolation cycle rate of the motion control, an important feature for many machine applications.

The local bus modules are designed for the use in the embedded controllers E°EXC 66 and E°EXC 66 compact. Alternatively, distributed automation solutions can be implemented to reduce cabling using a CAN bus coupler (CANopen®).





## Certified **Safety** up to SIL3

Safety functions as per Safety Integrity Level (SIL) are an integral part of Eckelmann's range of solutions.



### **E°SLC** Safety Logic Controller

The Safety Logic Controller E°SLC 89 is the programmable safety controller for Eckelmann's series 89.

It is attached to the E°EXC 89 and programmed using CODESYS V3.

Thus, CODESYS turns into a single point of engineering for the complete automation solution, including safety-related functions.

In addition to the E°SLC 89, the safety modules of the UBM I/O series are available. This simplifies the implementation of centralised and decentralised safety concepts.

### **E°Darc SCM** Safety Controller Module

For modern machinery, locking them completely is often impractical when the safeguards are open. To be able to work effectively, the machines need to be moved with open safeguards for set-up and maintenance processes and to ensure the safety of the operators, only limited speeds and routes are permitted in such cases.

Using the parameterisable Safety Controller Module together with the E°Darc drives, this task can be solved elegantly and most importantly without additional angular sensors.

If the SCM detects an impermissible movement, the complete machine is immediately returned into the safe state.

The module comes with certified safety functions up to SIL 3 or PL e.



### **E°Darc SSW** standstill monitor

The SSW is based on an encoder module that is used to determine the position and speed of high-frequency spindles (up to 40,000 rpm). The system complies with the Safety Integrity Level 2 (EN 62061) and/or performance level d (DIN EN ISO 13849-1).

Benefits:

- Space saving
- Easy cabling
- Cost optimised
- Reduced response times



www.tuv.com  
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## E°PC: Programmed for success

Our industrial PCs of the E°PC family fulfil high robustness and durability requirements. Our broad product range offers a wide choice of size, performance and equipment options and allows you to configure an individual customised solution.

### Sustainability in design and service

Eckelmann warrants a continuous sequence of products for all E°PC as well as a sustainable service concept – with a guaranteed long-term availability of spare parts.

### Box PC and Panels

Thanks to their compact design, the high-performance Box PCs from Eckelmann are perfectly suitable for control cabinet installations. The PC hardware is adapted to individual requirements.

Its touch panel can be integrated at any place remote from the IPC. For this, hybrid cable for video and USB are available – as single-cable solution with up to 100 m length.



### Fully customised industrial PCs and panels

IPCs and panels offer a particularly large scope for technical possibilities and options. You can rely on our customer specific solutions that are perfectly adapted to your application.

Customised E°PC or OEM solutions under your own label offer exactly your desired features for hardware, interfaces, configuration, design and colouring.

Even for low quantities, customised IPCs and panels by Eckelmann not only allow you to reduce your production costs per machine, but also convince with their unique look and feel.



### Panel IPC

Panel IPC are available in sizes from 7" to 21" and in 4:3 as well as 16:9. In addition to the size, there are various performance options for the panels available, from Celeron up to i7 processors.

Upon request, the design of the panel-IPC can be adapted to customer requirements, for example by integrating additional hardkeys. Naturally, all panel-IPCs for industrial use are made especially robust und compact.



## E°Darc C: High-performance servo controllers

The innovative control system in FPGA technology makes servo controllers of the E°Darc range absolutely first class in the power range from 2 kW to 16 kW.

The allows for the parallel processing of current, speed and position controllers and sets new standards for control accuracy and speed.

End customers benefit from increased dynamics and excellent processing quality of their machines.

Commissioning and configuration of the drives is easy and user friendly with the E°Tools Drive.

## E°Darc C DUO: 2-in-1 controller

The E°Darc C DUO offers a controller variant with two power amplifier in one housing, if cost and space requirements are paramount.

## E°Darc B: Save energy using a buffer module

Dynamic applications with short cycle times and quick start-stop movements use a lot of valuable braking energy. With electronic buffering, this energy can be used and the capacity of the direct current intermediate circuit be increased.



## Quick communication

### „Plug & Play“

For the E°Darc, the required fieldbus standard and a large range of encoder interfaces are available thanks to the comfortable insertion of option cards: CANopen® or EtherCAT® as fieldbus variants and Hyperface, Resolver, EnDat and BiSS for the encoders.

## E°Darc K: The allround controller

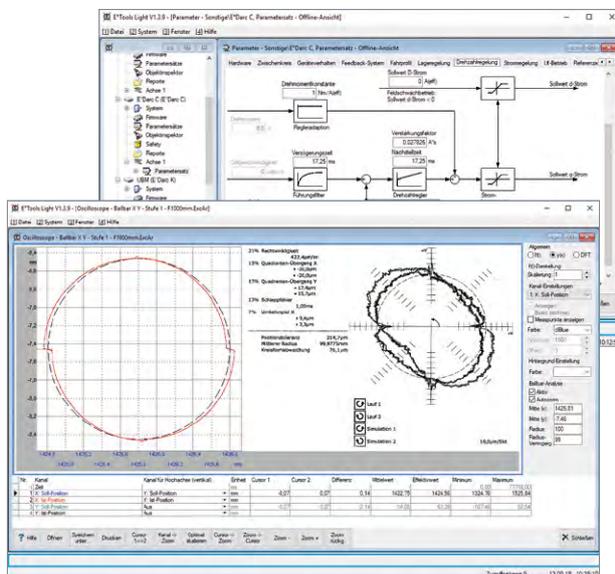
The model E°Darc K offers a perfectly tuned solution for the lower and middle power range of 200 W to 4 kW. This compact drive controller comes with a 230 V supply and an EtherCAT® as well as a CANopen® DS402 interface. Absolute encoders can also be used.



## E°Motor: The compact drive

The servo motors are characterised by their very high power density and the widely usable speed range of 8,000 rpm.

The motors are available in different sizes of up to 80 Nm and with different moments of inertia according to your requirements.



## E°Tools Drive: The high-performance commissioning tool

The E°Tools Drive is a service tool for our complete drive controller range. The user-friendly software is used to easily commission and diagnose the controllers.

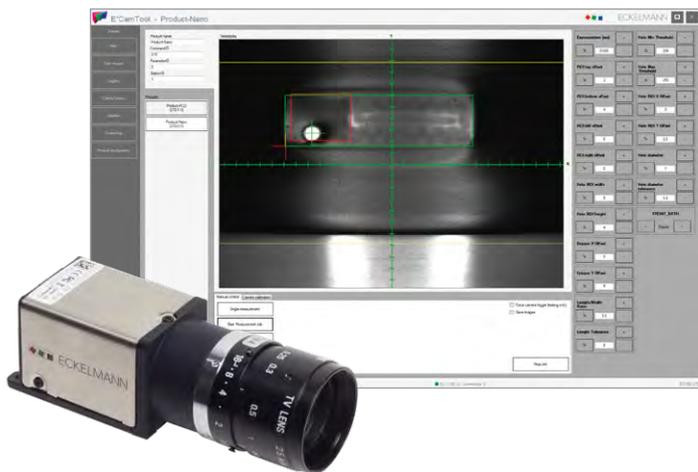
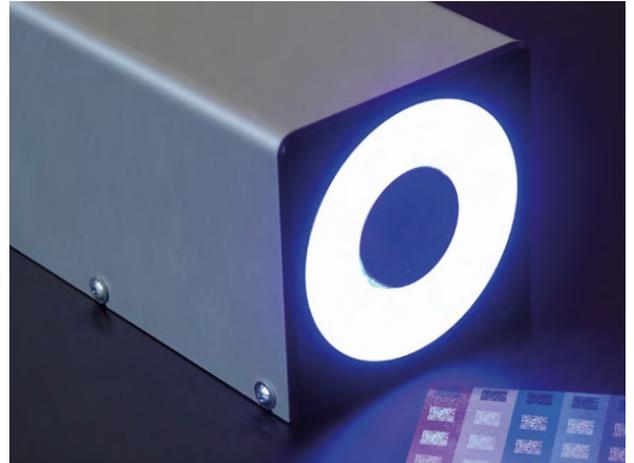
To optimise your machine, an 8-channel online tracer and a ballbar analysis are available among others. Unwanted resonance frequencies may be suppressed by using a notch filter.



## E°SEE: Image processing for machines

Industrial image processing has developed into an important catalyst for increasing the level of automation in production processes and is regarded as one of the key technologies for Industry 4.0.

Machine vision has become indispensable in quality control and identification of products as well as in process control and monitoring. Only when using modern image processing systems can the current requirements for traceability, quality, cycle time and safety be implemented.



## Integrated machine vision

The integrated image processing systems from Eckelmann are optimally adapted to your application and enable you to solve challenging automation tasks elegantly and economically.

Eckelmann offers you powerful components for your machine vision solution; from cameras, optics and illumination to PC based analysis and real-time integration into machine control and user interface.

Image processing extends the machine's visual capabilities. The smarter machine vision and control are integrated, the greater the benefits. Therefore, many machine manufacturers consider image processing as a useful and very versatile add-on, long since part of the innovation model.

Trust in over 15 years of engineering experience with sophisticated image processing solutions for machines and systems.

## Applications

- Visualisation of machine, process and component
- Automatic calibration and measuring
- High-precision contour measurement
- Recognition of bar codes and matrix codes
- Position identification of components
- Automatic target track generation
- Camera controlled monitoring and processing
- Detection of bad marks and markings
- Programming support through live image display and "Point and Teach"

## Machine Management System (MMS)

More transparency for a more efficient production. Improved order management for higher machine utilisation.

### MMS for the shopfloor of the future.

The MMS is a powerful Industry 4.0 Framework for the implementation of an agile, future-oriented shopfloor management system. With MMS, machines can be networked efficiently and transparently, **independently of manufacturer**, using **IoT** technologies.

This creates an interface between machine level and the higher-level MES and ERP systems.

Numerous functions are available to the user: **machine dashboard**, **operating data acquisition**, **order management** as well as **reporting** and **real-time alert features**. The web application provides these function for stationary terminals or mobile devices.



The **machine dashboard** provides **real-time** production insights. One screen shows an overview of all machines as well as the currently processed and queuing orders.

Furthermore, you can generate orders and allocate those to the machines using the **order management** function. Automatic nesting and intelligent material management simplify planning and ensure efficient utilisation of materials and resources.

Use the MMS on mobile devices such as smart phones and tablets with the **MMS App**. Main function: **Real-time** monitoring of the machinery and detecting events.

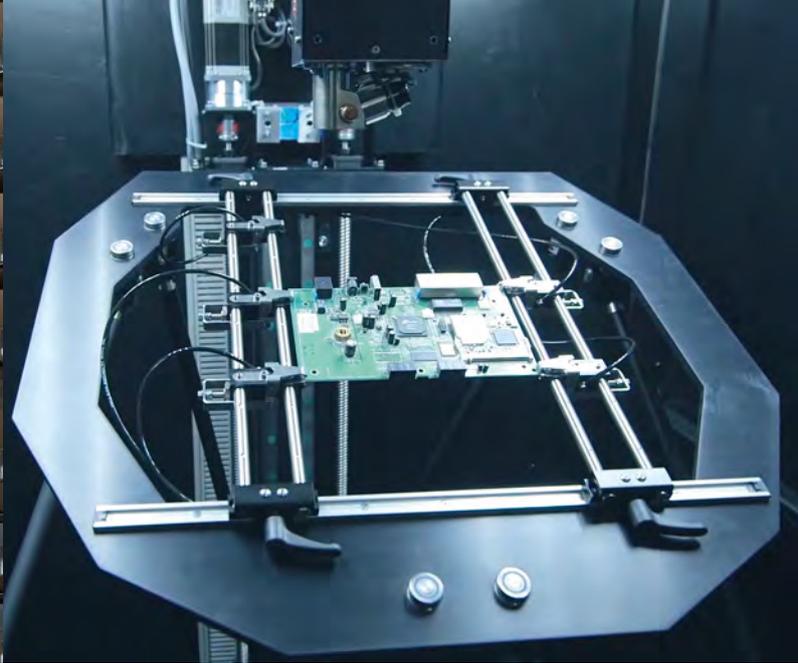
Once an order is complete, the machine operator immediately receives a **push message**.

Thus, new orders can be allocated to free machines more quickly to minimise downtime and optimise production capacity.





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## All the **PLC** you'll ever need

Eckelmann already has the complete PLC solution for all common tasks in machine control in its hardware and software toolbox. From the extensive range of components, something suitable can be created for any application. Following the motto "As much as is required, yet as little as possible", controllers, drive controllers and motors, terminals and I/O modules are selected as required and seamlessly combined. Comprehensive and proven function libraries facilitate application development.

Moreover, Eckelmann's complete solutions grow with your requirements. Once an application software has been developed, it can easily be ported to new hardware configurations. This makes any machine solution flexible and saves development costs and time.

## Applications

Eckelmann's PLC solutions are an integral part of Motion Control and CNC applications, but they are also employed as stand-alone systems.

The target industries are diverse and reach from mechanical engineering, the packaging industry and intralogistics to medical technology.

## Motion Control

### 64 at once

Many machines and systems require the coordinated operation of several servo axes. Here mechatronic solutions replace reliably, cost-effectively and flexibly the thus far predominant pure mechanical systems such as the conventional vertical shaft, gears and cam discs.

With the MC software library, Eckelmann controllers of the E°EXC range become complete Motion Control controllers. Their performance (up to 64 axes), the choice of interfaces and the size may be scaled as required for the individual machine task.

The programming of the motion sequences with the proven tool CODESYS is done using Eckelmann's own PLCopen-certified function library. The library is the result of long-standing application-oriented development and offers a solid foundation for innovative Motion Control applications. The E°EXC controllers bring synchronisation and precision to perfection!

## Applications

Motion Control solutions based on E°EXC fulfil the strictest precision and dynamics requirements, as for example in the following applications:

- Rotary die cutting
- Industrial sewing machines
- Hose processing
- Wafer handling

For the processing of watering hoses, Motion Control was intelligently combined with image processing. Thus, 2,000 integrated drip-dosing units per minute can be drilled precisely. A machine vision system monitors the drilling and performs on-the-fly measuring tasks that are used for the automatic fine-tuning in the double head drilling station.



© Kjellberg Finsterwalde Plasma and Maschinen GmbH

## Better through experience: Complete CNC solutions

The Eckelmann CNC core is based on DIN 66025 and comprises many advanced features, which have been consistently expanded during decades of experience. The integration of typical technological and geometric requirements allows for a very broad range of applications.

The CNC core supports even the most sophisticated multi-channel CNC applications with cycle times of < 1 ms. Here the PLC functionality is already integrated. A broad range of interfaces fulfils all requirements for connecting to I/O module and drives.

We also support our customers with the technology specific design of user interfaces and devices. Thus, they combine proven functionality with user-friendly design.

## Applications

Many machine manufacturers and users trust the proven capabilities of Eckelmann's CNC. Their applications are most diverse ranging from grinding, milling handling, bar processing, shaping etc.

As current industry solution Eckelmann offers the all-rounder E°CUT, "CNC for cutting".

The relevant HMI module as well as the NC and PLC operating system offer numerous functions that are adapted to typical cutting requirements. The most diverse choice of tools and technologies is supported.



Ethernet



CANopen®, EtherCAT®



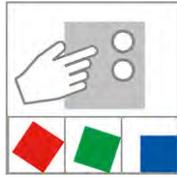
- Reverse function with restarting on contour
- Interrupt function with subroutine editing
- Block scan for random access to the contour
- Track dependent analogue output for the power control
- Transformations (5/6 axes) for different kinematics
- 3D axial adjustments
- Track dependent switching functions
- Technology specific functions



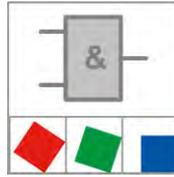
# Product overview

## Software

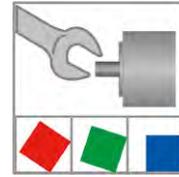
### Tools



E°Tools HMI



E°Tools PLC



E°Tools Drive



Safeconf

## Industrie-PC, Panels and Terminals

### Panel-IPC



E°PC C4007  
E°PC C4010



E°PC C0515  
E°PC C0615



E°PC C0518



E°PC G0315e  
E°PC G0321e

## Embedded Control

### Controller



E°EXC 66 can  
E°EXC 66 rte



E°EXC 66  
compact



E°EXC 89



E°EXC 880  
E°EXC 882

## I/O

### E°UBM



Communication  
BK-EC  
BK-CO



Digital  
04DI-P 04DO-P  
04DI-AC 08DO-P  
08DI-P 16DO-P  
16DI-P



Analogue  
04AI-1x 04AO



Function  
02PWM-02 04TC  
01CNT-DO 01COM-RS  
16PD-GO PS-I  
16PD-PI PS-O  
16PD-PE



Safety  
2DI-PS-O-D-S

## Drive systems

### E°Darc



E°Darc C04  
E°Darc C08



Drive controller  
E°Darc C16 E°Darc C04D  
E°Darc C32 E°Darc C08D  
E°Darc C48

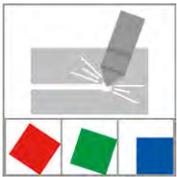


Supply unit  
E°Darc P05 E°Darc P25  
E°Darc P10



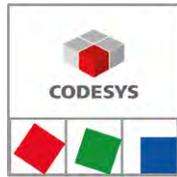
Buffer Modul  
E°Darc B08

## Technologies

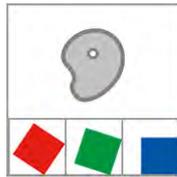


E°CUT

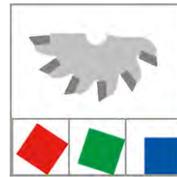
## Firmware



PLC



Motion



CNC

## Documentation



E°EDP  
edp.eckelmann.de

## Box-IPC



E°PC G0321



E°PC B0301



E°PC B0202 inkl. E°PL 20

## Panel



E°Panel Cutting

## Safety



E°Darc  
C02-5 C04-5 C08-5



E°Darc  
C16-5 C32-5



E°SLC 89  
Safety Logic Controller



E°UBM



E°Motor

## Fieldbuses



## E°LBM



Communication  
BKCAN  
SER02



Digital  
DIM16 DOM16  
DOM04 DIO88



Analogue  
AIO22  
PWM01



Function  
Axis  
ARI01



Support  
CON16  
PWR04  
EXT01

## Image processing



E°CAMBOX

## E°Motors



E°Darc K04  
E°Darc K04e



Drive controller  
E°Darc K10  
E°Darc K10e



E°Darc K313



Servo motors 320 V  
E°SU3 S  
E°SL3 Compact

Servo motors 560 V  
E°SM  
E°SL Compact



## Networked intelligence – machine automation@Eckelmann Group

We are always there for you – **globally**. With diverse know-how the experts in machine innovation within the Eckelmann Group offer you innovation partnership as equals.  
If you have any questions, **please contact** us.

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