Issue 02/2012

sercos news

the automation bus magazine

Efficient Data Logistics

Integrated Machine Communication with sercos

Economical
Brilliancy with
Lower Energy

Simple
Complexity Hiding
with sercos

Safe
Savings Potentials
for Safety Technology

Dear Readers,

Peter Lutz,
Managing Director
sercos international e. V.

The wide range of communications protocols has made machine integration and the establishment of a universal safety protocol a complex and costly task. sercos responded to this situation early on and can already present suitable solution concepts:

1. An independent, pre-certified and easily portable protocol software for CIP Safety on sercos allows for fast and simple implementation of CIP Safety functionality in sercos and Ethernet/IP devices on a customer-specific target platform. This minimizes development costs and investment risks (see page 15).
2. Ethernet/IP and sercos devices can now be operated via one single Ethernet cable. As a result, the topology is simplified, the number of interfaces decreases, and scalability increases. Engineers and users can continue to use their preferred product suppliers and devices (see page 8).
3. sercos networks can now be installed even more flexibly into a machine or system. Because, in addition to the ring and line topology, it is now possible to implement branches that can be switched on and off during operation. Field devices can also be integrated into a network using only one connection for bus and power (see page 7).

With these new developments, sercos has managed to achieve significant improvements for simple, safe and inexpensive machine networking. sercos users profit from more device diversity, more options and fewer expenses.

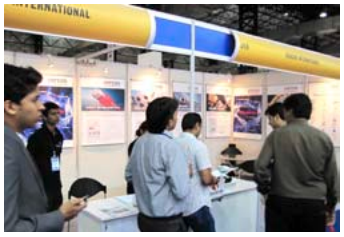
Have fun reading!

S Content

Establishment of sercos Asia

The newly established organization is in charge of marketing and standardization of sercos technology in Asia. The headquarters of sercos Asia is located in Beijing under the auspices of CAMETA (China Association for Mechatronics Technology & Application), with which sercos has enjoyed more than 5 years of close and trusting cooperation. A branch office is located in Tokyo, offering local support to Japanese manufacturers and users of sercos technology. Various types of memberships are available for sercos Asia. They are conceived in such a way that they allow easy access to sercos technology on the one hand and ensure the financing of a manufacturer-independent business office on the other. ■

Review India



The Automation 2012 trade fair is considered to be one of the key trade fairs for automation and robotics in the Indian economic region. A large number of customers took the opportunity to gain information about the most recent trends and the latest sercos-related products. The great number of system integrators and automation manufacturers with specific implementation and application questions and an interest in technical details was an indicator that industrial networks are playing an increasingly important role in the Indian industrial sector. ■

sercos eLearning

Different modules explain the technology of the automation bus as well as the functions and benefits of applying sercos in industrial automation. All modules are available through guest accounts. No registration or subscription is required. ■

sercos eLearning can be found here.

Please note:

Storing data and taking the certification test require prior registration. The course is currently available in English.

´Complexity Hiding´ for PacDrive 3:

Fast Device Replacement – The Quick Path to Component Integration

In the future, the success of sophisticated technology solutions and products will increasingly rely on how easy they are to handle. From the outset, "complexity hiding" has been a key success factor of the PacDrive from Schneider Electric. Featuring automated addressing of devices connected to the sercos interface as the basis for a fast device replacement concept, Schneider Electric is taking another step in this direction with its new PacDrive 3.

‚Complexity hiding' is currently booming. The increased functionality of automation systems generally does not lead to simpler handling. For this reason, Schneider Electric has long since relied on masking the complexity of automation systems or their software. A prime example is PacDrive, an automation solution with central intelligence for controlling entire machines with motion and/or robotic components.

Complexity hiding is an integral part of the automation solution, which is already available in the second generation. In fact, the basic concept of a common control for PLC, motion and robotic components of a machine already is complexity hiding in practice – despite the powerful performance that can synchronize up to 99 servo drives or 30 robots, all functions can be carried out in programs that comply with the IEC 61131-3 standard that was initially developed for pure PLC applications. For this to work, all complex algorithms had to be encapsulated into software modules with multiple parameter and adaptation options.

Whether sophisticated diagnostic functions, the integration of motion and robotics into IEC 61131-3 compliant programming, or template-based programming models with their transition from programming to parameterizing, PacDrive has been a pioneer of many currently established technology concepts. With the transition to sercos III, Schneider Electric has introduced another feature in its latest PacDrive generation.

Advantages for Mechanical Engineering and Machine Operators

Automated device addressing for core components of an automation solution that are connected to sercos offers advantages for both mechanical engineering as well as machine operators. For mechanical engineering, it offers time savings and the elimination of potential error sources, while machine operators benefit even more – they not only save time when replacing components, but also no longer require highly qualified staff for this task, coupled with simplified spare parts warehousing.

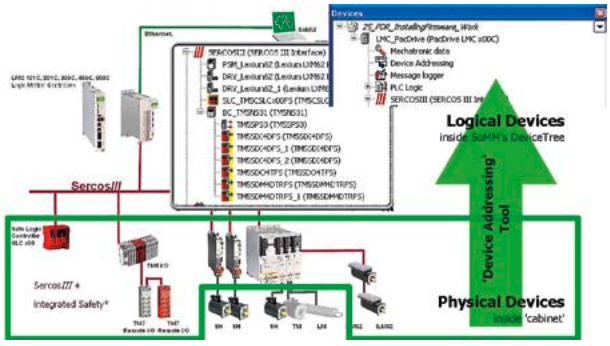
At its core, device addressing is an automatic integration of components that are newly integrated into the sercos communication – during the set-up and installation of an automation solution or in case of replacements, devices, such as servo amplifiers and motors, are integrated into the sercos communication by creating a physical link to the bus. The next step consists of connecting the logic of the physically present devices or mapping them through the software. This is required for both initial installation as well as component replacements. Adding or removing components is also occasionally required in option concepts where machine modules with mechatronic components are added, removed, or replaced.

No manual entry of device data

For both engineering and service, PacDrive offers ways to automatically logically integrate new sercos users. During the initial setup of the automation solution, the sercos users are integrated into a tree structure following the physical integration into EPAS, the engineering tool for PacDrive 3 in the SoMachine motion workbench. Similar to the directory structure of Windows Explorer, the hardware tree lists all components of the automation solution that are integrated into the sercos communication. Clicking the respective element opens a window with the specific device data. However, this data does not have to be entered manually.

A simple click with the mouse initiates a hardware scan that results in the automatic recognition of all newly added devices to the sercos communication. The list is displayed as a table in an output template supplemented by diverse device information. The sercos scan reads the electronic data labels that are integrated on all devices for PacDrive.

The next step is data migration. The program generates a query and upon a positive answer the tool will automatically enter the devices into the hardware configuration and allocate the individual data to the entries. With this automatic process, the manual creation of individual device-specific data sets is completely eliminated. This saves time and prevents data entry errors.

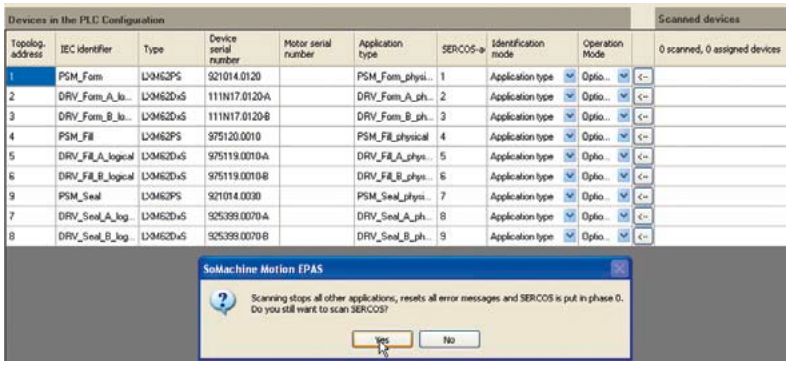


The sercos scan functions for all components that communicate via sercos: servo regulators, integrated drives, I/O modules and safety controls

Automatic allocation of bus addresses

With sercos III, sercos addresses no longer have to be set manually, for example with a DIL switch, but can be allocated by the software. One advantage of this is the automated address creation, which is also used by PacDrive. In addition, the allocated sercos addresses can also be altered.

This option of different modes for the identification of sercos users offers the possibility of taking the specific characteristics of a machine concept into account: In the PacDrive engineering tool EPAS, identification can take place via the device number, the motor serial number, the topological address, the type of application, or the sercos address. For most types of applications, the topological identification is the best method and is therefore also recommended for all standard situations. However, if a machine is based on an extensive modular concept with various option modules, identification via the type of application or sercos address is more elegant. With the first option, the sequence of devices would be `constantly jumbled´ when adding and removing option modules in the hardware configuration, and the clear structure, the main advantage of the hardware configuration, would be lost.



List of all hardware components on the sercos bus, start of the scan

For device replacements, the situation differs slightly from that of initial installation during engineering. The EPAS development environment is not present – however, this is not actually required, as PacDrive controllers feature an integrated clear text display. After the physical integration of a device into the sercos communication has been completed, the `FDR´ mechanism is started on the controller. FDR stands for `Fast Device Replacement´, i.e. the automatic logical integration of new automation components into the automation solution or the sercos communication.

The integrated display is the basis for communication during device replacement by service staff.

Automatic firmware adjustment

The FDR mechanism initially activates a sercos scan based on the device addressing function. The data migration of the device (or of several devices) and address generation take place simultaneously and fully automatically. In addition, the firmware of the new component is tested. If it is the wrong version, the controller independently replaces it with the correct version. The prerequisite for this option is that all firmware versions are copied onto the flash disk of the controller. These can be found in the SoMachine engineering workbench.

FDR reduces replacement of an automation component to the mechanical work and the connection of the cables for the power supply and the communication. A laptop for parametrization or firmware adjustment is no longer required. At the same time, the number of versions that have to be on stock is reduced. If the servo amplifier and motors are mechanically compatible and offer the required performance, they can be used independently of the firmware status. Everything else is handled by the FDR. The amount of time that is thus saved for a component replacement during running operations can be easily figured out. ■

S Contact

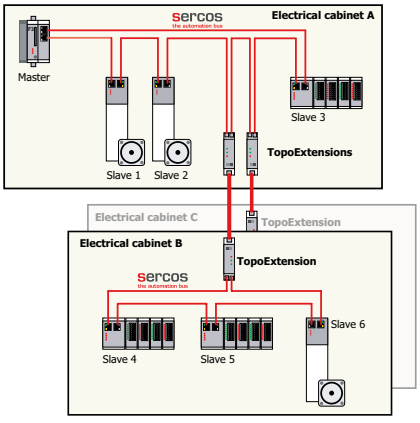
Schneider Electric Automation GmbH
Schneiderplatz 1
97828 Marktheidenfeld, Germany
Phone +49 9391 606-0
Fax +49 9391 606-4000
www.schneider-electric.com

New Installation Options
Thanks to Topology Extension

A crucial factor for the acceptance of a bus technology is the effort involved in installing the field devices to be networked and the bus topologies available for implementation. The TopoExtension from CANNON-Automata is creating new installation options while simplifying the wiring of large and modular machines.

Simplified topology on modular machines

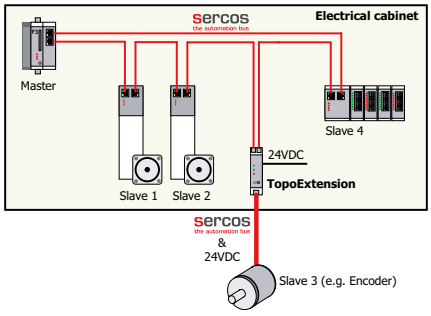
Features such as hot-plug capability and redundancy are crucial advantages of sercos compared with other realtime Ethernet protocols. Thanks to these functions, individual devices or complete machine aggregates can be switched on and off during operation without losing realtime data. The installation effort required to support this option can be minimized with the TopoExtension. The module combines the cables needed for the ring topology into one and divides them again where required. Individual machine modules can be connected via a single communication cable while consistently maintaining the ring topology. A digital input is used to activate or deactivate the branch connection. This makes it possible for the control to integrate or remove product or status-dependent machine functions or aggregates during the manufacturing process, which helps to reduce the machine's power consumption.



Wiring of multiple machine modules or aggregates spread over various control cabinets

Connecting field devices via one single cable

Field devices are becoming increasingly peripheral and are mounted as close to the process as possible. Because of the installation situation and their compact dimensions, these devices often cannot be equipped with multiple connectors. This applies particularly to encoders. The TopoExtension offers a simple solution that harmonizes the requirements resulting from the installation situation with the advantages of a ring topology. The power supply, as well as all the communication lines required to maintain the ring topology, are connected via a single cable. Thus, the field device only needs to be equipped with a single connector for bus and power and only one cable is required between the control cabinet and field device.



Integration of a field device into the ring topology via one single cable incl. power suppl

Designs

Currently, the TopoExtension is available for hat rail assembly in protection category IP20. It is equipped with two RJ45 plugs for integration into the sercos bus and one RJ50 plug for forwarding the communication lines and the 24 V DC. In addition, it has a digital input to activate or deactivate forwarding. This input can be bridged manually via a switch.

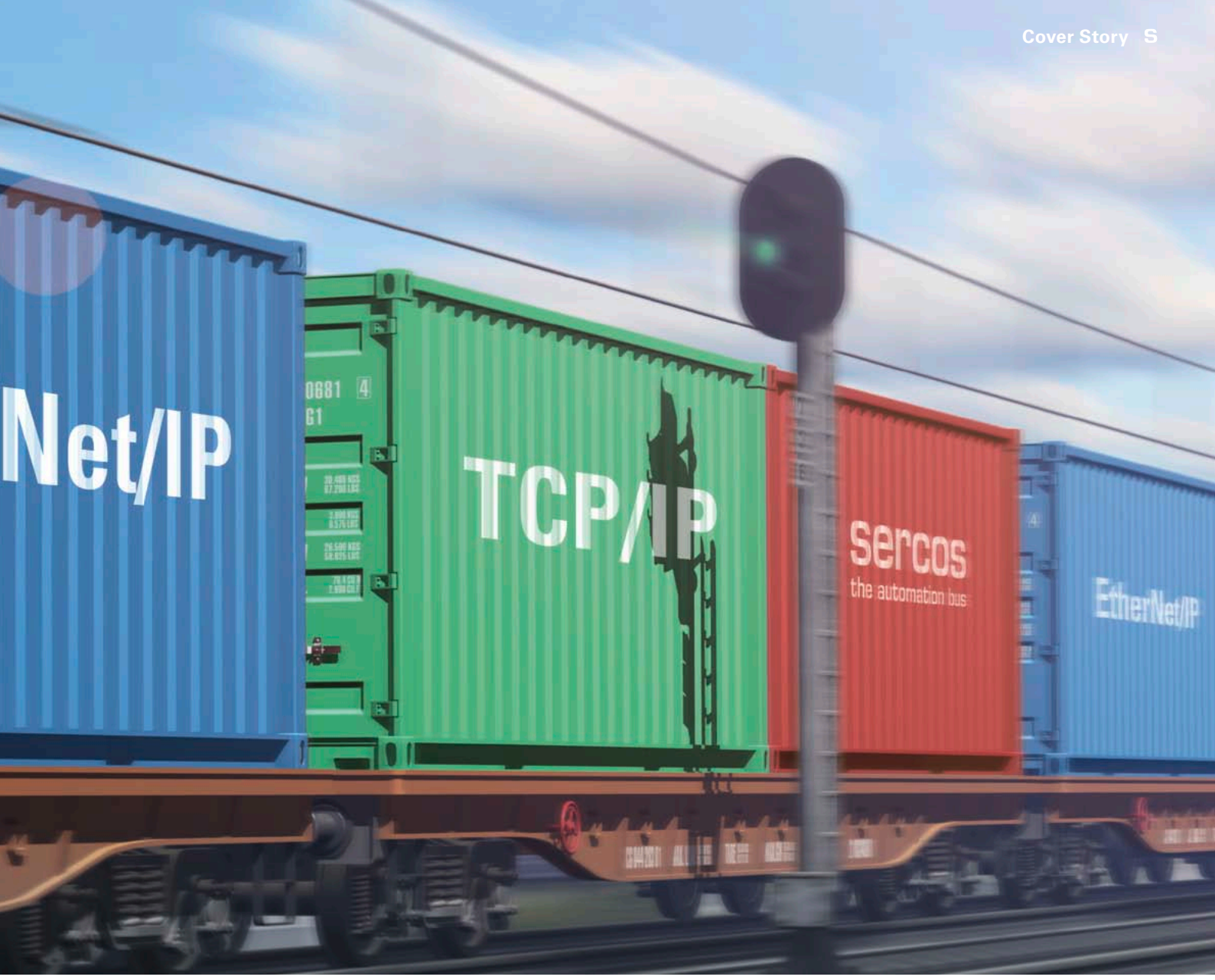
An option with protection category IP67 is currently being prepared. ■

S Contact

Automata GmbH & Co. KG
Phone +49 8233 7916-0
Fax: +49 8233 7916-99
www.cannon-automata.com

On the Right Track

Communication via sercos and EtherNet/IP is now possible in one cable



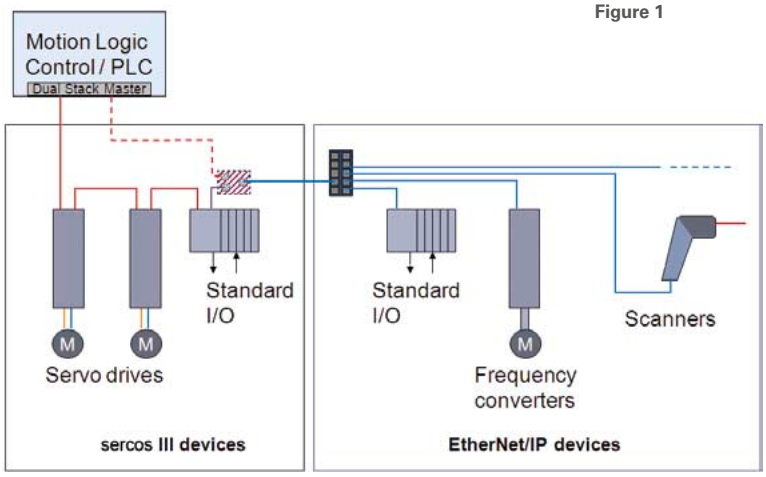
In the past, two pressing development areas have emerged for machine communication: an increase in safety during operation and a decrease in wiring complexity. Because diversification in automation technology has made machine integration and the establishment of a universal safety protocol a complex and costly task. There is now a solution for sercos that allows EtherNet/IP and sercos devices to be operated via one single Ethernet cable.

In order to implement new machine concepts, more and more manufacturers use Industrial Ethernet solutions. But even if the technical advantages are obvious, they do not automatically render functioning systems based on traditional fieldbuses obsolete. The change is further complicated because there is a whole range of competing communications protocols, all of which want to use Ethernet technology in engineering. Users and developers have to weigh the pros and cons exactly. How many suppliers support a solution? To what degree have the standards been standardized? Does one solution cover all fields of application or is it optimized for one area? How strong is individual suppliers' influence on future developments?

One cable is enough

For a while, Industrial Ethernet was considered a long way off, but a new trend has emerged: manufacturers and users have familiarized themselves with the new technology and work on the concrete implementation of innovative machine concepts that utilize the advantages of Industrial Ethernet. Many market leaders choose sercos III as the platform for their targeted entry into the Ethernet world. The approach to a common Ethernet infrastructure for sercos and EtherNet/IP presented to the public for the first time at SPS/IPC/DRIVES 2012 shows that communications protocols do not necessarily have to be transmitted via a different network infrastructure. This concept dramatically reduces the number of communications interfaces and thus the hardware expenditure. Universal networking increases cost effectiveness in engineering and system operation.

Figure 1



Coexistence of sercos and EtherNet/IP

EtherNet/IP and sercos: at a first glance, it seems as if two worlds are colliding. EtherNet/IP is mainly based on standard hardware and is thus flexible enough to cover diverse applications in the industry. However, compromises had to be made in terms of precision, especially with time-critical applications. sercos, on the other hand, was originally designed to ensure 100% realtime communication, even under the toughest conditions. This requires the use of specialized hardware.

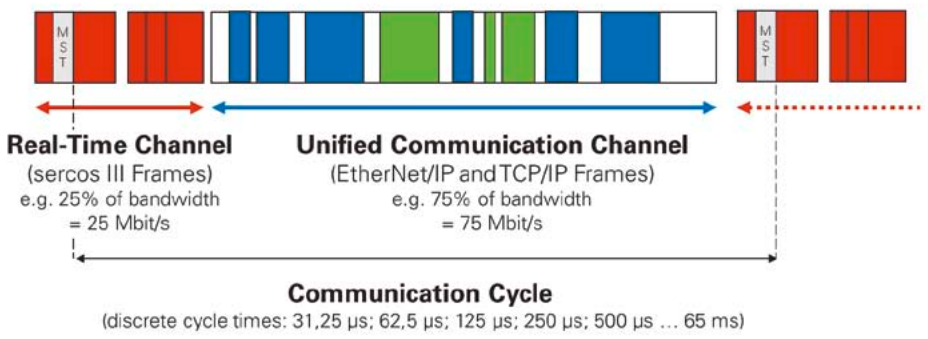
Perfect complement

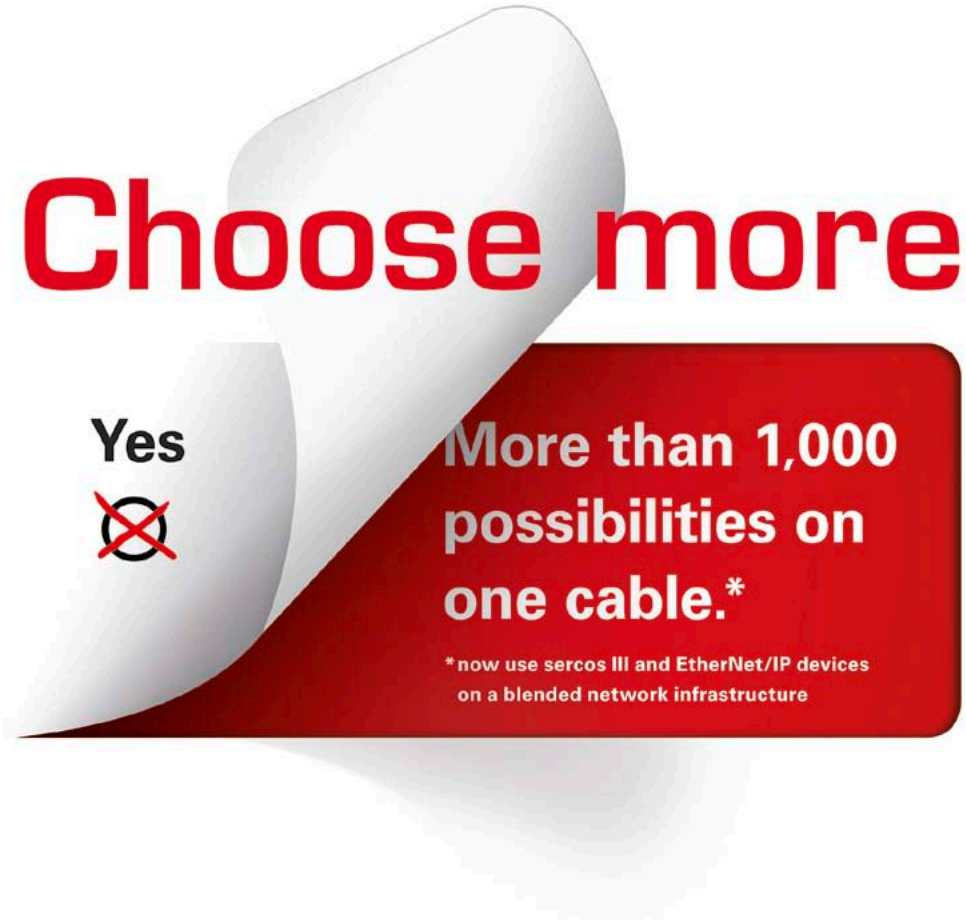
Why should both of these worlds now be connected? Because they complement each other perfectly. EtherNet/IP is a widespread, proven technology that is supported by numerous manufacturers and products. It establishes connections to other networks and – like sercos – allows the CIP Safety protocol to be used universally. "We are convinced that today's great variety of automation technology requires a new conceptual approach to simplify integration of machinery in manufacturing," said Peter Lutz, Managing Director of sercos international. "For this reason, we have cooperated with ODVA and the OPC Foundation in identifying topics that result in considerable technical and market synergies for users and providers." The coexistence of sercos and EtherNet/IP in one cable is a step in this direction. In the process, the users profit from numerous advantages: costs and the complexity of machine integration decrease, safety increases and realtime communication is maintained

Timeframe available

The migration to Ethernet was accomplished with sercos III. In order to avoid jeopardizing realtime capabilities, the sercos network was separated from standard Ethernet. But standard Ethernet communication was assigned a timeframe for installation tasks and diagnostic cycles. This is possible thanks to the high efficiency of sercos telegrams, which only use a part of the runtime on the reserved realtime channel. For example, with an application with 64 drives, they require only approximately 400 micro seconds of a 2 millisecond loop. This means 1.6 milliseconds are available for other communication. This timeframe for non-sercos communication is called "unified communication channel" (UCC). This channel sits directly on the Ethernet layer without tunneling, allowing the connection of users who do not have sercos, but instead support a different Ethernet-based protocol.

Figure 2





sercos master – EtherNet/IP scanner

This approach allows sercos devices, EtherNet/IP devices and additional Ethernet participants to be combined in a common network infrastructure of a machine or system. The existing sercos and EtherNet/IP specifications do not need to be altered for this, since the corresponding communication mechanisms are already an integrated component of the sercos transmission method. A sercos master and an EtherNet/IP scanner are required for control. Figure 1 shows both combined as a dual stack master. The motion controller coordinates movement via sercos. If redundancy isn't required, the devices are connected in a line topology. If the last sercos device recognizes a non-sercos device on its second Ethernet port, it only forwards the non-sercos telegrams that are intended for other devices. Reversely, the device forwards incoming telegrams to the dual stack master via the first Ethernet port, using the UCC to do so. Standard Ethernet telegrams that are received in the time reserved for the realtime channel are held and subsequently forwarded. If the application requires a sercos ring for redundancy, a special switch (an IP switch) must be implemented in the ring. It introduces the EtherNet/IP package into the sercos ring. EtherNet/IP devices can be arranged in various topology types: star and series topologies, as well as DLR.

Reliable connection

Because no dual master system is available yet, proof of feasibility was provided. A separate EtherNet/IP scanner module was connected with the unused Ethernet port on the sercos master. Both a basic configuration with three sercos drives and seven EtherNet/IP devices as well as an advanced installation with 64 sercos drives were tested. sercos version 1.3 impressed with its performance and gave striking proof of the reliability of its connections to EtherNet/IP. ■

S Contact

sercos international e. V.
Kueblerstrasse 1
73079 Suessen, Germany
Phone +49 7162 9468-65
Fax +49 7162 9468-66
www.sercos.de

Savings Potentials for Safety Technology

The Coordinates of Efficiency

Bihl + Wiedemann
THE AS-INTERFACE MASTERS

Regardless of the system size, a suitable safety concept promises considerable savings for every dimension – frequently coupled with added performance and safety. The new AS-i 3.0 sercos Gateway with SafeLink from Bihl+Wiedemann enables safe networking of several AS-i segments via Ethernet with no additional expense – for flexible safety applications.

For large, distributed systems – SafeLink via Ethernet

62 was something like a magic number for the simplest safety bus in the world: this is exactly how many safe devices could be handled by an AS-i double master with integrated safety monitor. As soon as just one more slave needed to be connected, the pivotal question immediately arose: what is the most efficient way to implement this in our particular application?

Of course there were answers out there already. The simplest of these was to couple safe signals through potential-free contacts. The advantages for the user are obvious: he can implement the coupling using existing hardware anytime and anywhere. But the other side of the coin is equally obvious: since this approach invariably requires a kind of parallel wiring, it really only makes sense when the number of signals to be coupled can be counted on the fingers of one hand. When more safe signals need to be coupled, connecting multiple safe networks directly over AS-Interface was a solution. But this unfortunately meant that one AS-i segment per gateway was lost to achieve coupling.

Still, until recently this range of solutions was sufficient for most of the major requirements set by the market. Now we are seeing though a clear trend, both in factory and process automation, towards larger, decentralized systems. Specifically: what used to be considered an exception rather than the rule has now become the rule and confronts more and more users with the old cost barrier of 62 safe devices. Bihl+Wiedemann has now introduced a simple and inexpensive solution for the safe coupling of multiple signals – SafeLink via Ethernet in the latest AS-i Gateway generation with an integrated Safety Monitor. At full capacity, the AS-i 3.0 sercos Gateway handles collection of nearly 2000 safe two-channel input signals and centralized or decentralized control of safe outputs.

The innovative devices constantly and automatically exchange the input and output data of all involved machines and make it available to the respective program. With this solution, up to 31 of the new Gateways with integrated Safety Monitor can be coupled to each other – without sacrificing performance and without the need for additional hardware.

This unparalleled lean solution is not only suited for the ever larger pure safety applications, such as in the area of machine building. It also offers huge savings potentials to users who want to benefit from a key advantage of AS-Interface – the ability to send safe and non-safe signals over one and the same cable. It goes without saying that the number of integrated slaves is increasingly exceeded when combing Standard AS-i with AS-i Safety.

AS-i 3.0 sercos Gateway with integrated Safety Monitor and SafeLink over Ethernet

For medium-size systems: Gateways with integrated Safety Monitor and optimal integration

The common mid-sized safety application for systems with 10 to 100 safe inputs and outputs has also been witnessing increasing efficiency demands during the past few years. Subsequently, an increasing number of users are discovering the various advantages of the

Safety Basic Monitor

Bihl+Wiedemann safety concepts compared to both conventional safety relays and so-called safety controllers. The two key advantages of the AS-i Gateways with integrated Safety Monitor that collect and evaluate up to 62 safe signals per device are its unrivalled minimal cabling requirement and its optimal connection to the established automation systems.

While safe small controllers can almost compete in terms of wiring inside control cabinets, they must be elaborately wired conventionally in the field. For the safe AS-i components it is enough to connect them directly to the AS-i cable. Of course, this advantage not only applies to initial installations but also to subsequent expansions or conversions of the system. While the use of safety controllers requires additional wiring or the removal of old wiring for any minor change, the motto of AS-i is: Disconnect – reconnect – done!

Users also benefit in many ways from the excellent team player qualities of AS-Interface in combination with other automation systems. With the expanded diagnostic functions, complete switch off history and detailed uninterrupted status information about all AS-i components, the master control can respond even faster to errors and thus considerbaly decrease downtimes. However, the compatible interaction of AS-Interface and the control not only benefits machine availability, but also safety itself. This is because sensitive data is transmitted automatically and in real time to the standard controller (without any parametrization effort), which can then, for example, initiate the controlled shutdown of a system before it is cut off from the mains by safety technology. On the AS-i side, the Safety Gateway with integrated AS-i Master and Safety Monitor watches over the AS-i installation; sercos treats it as an I/O node with a variable number of input and output signals, whose number is determined by the AS-i configuration.

For small systems: Safety Basic Monitor with detachable AS-i Master – the new way to cut expenses starting from 3 secure signals

Until recently, providers of safety technology and their customers had a popular math problem – they repeatedly calculated the system size from which it would pay off to finally put the good old parallel wiring to rest and switch to AS-i Safety. Today, this problem can be considered solved – even without taking into account the many functional advantages of a bus system, since by now AS-i Safety is the clear winner, also in terms of costs, in any system with 3 or more safe signals.

There are two primary reasons for this. One, since the introduction of AS-i Power24V it is possible to dispense with the AS-i power supply unit for very small applications. Two, Bihl+Wiedemann has introduced a new way to cut expenses with the Safety Basic Monitor. Similar to its larger brother, this device consists of a Safety Monitor and a detachable AS-i Master but was otherwise developed based on the concept of "Reduce to the max" – for example, it does not have a fieldbus interface but only signal outputs to communicate with a potential master control. And its inner life is not encased in heavy-duty stainless steel but in a slim IP 20 plastic housing.

In keeping with the increased selection of tailor-made safety concepts for systems of all sizes, Bihl+Wiedemann has also expanded its range of associated application components. It extends from multipurpose input and output modules via optimized software solutions up to powerful Speed Monitors and EMERGENCY OFF switches. Today, the safety portfolio of the German solution provider includes practically anything. What's more, every order includes a standard feature – efficiency, which is a growing concern in the safety sector. ■

S Contact

Bihl+Wiedemann GmbH
Flosswoerthstr. 41
68199 Mannheim, Germany
Phone +49 621 339 96 0
Fax +49 621 339 22 39
www.bihl-wiedemann.com

CIP Safety™ on sercos

CIP Safety on sercos – Secure Protocol Software from IXXAT

sercos is one of the fastest communications protocols in the market, especially for demanding automation tasks, and allows for highly dynamic and precise applications in the area of machinery and equipment. But speed and dynamics also increase the potential hazards for humans and machines. Fast-reacting, parameterizable safety equipment is required to counter this risk. With the CIP Safety protocol, a safety-related application can now, for the first time, take complete advantage of the transmission potential provided by a potentially unsafe medium (such as sercos or EtherNet/IP). It allows for simple cabling and configuration of the security functions via the existing, potentially unsafe communication bus. Users profit from shorter set-up and changeover times.

A consortium was created within sercos international to implement the CIP Safety protocol in sercos devices. It consists of Bosch Rexroth, WAGO, Schneider, KEBA und Bihl+Wiedemann. The goal of this consortium was to develop a common CIP Safety protocol software for the highly diverse sercos master and slave devices. IXXAT was selected as a service provider with the corresponding experience required in developing safe communication software for SIL-3 applications, in accordance with IEC61508:2010.

The CIP Safety protocol software resulting from the close collaboration with the consortium members is a pre-certified module for implementing safe originator and target devices based on CIP Safety technology. IXXAT will soon sell and sub-license the CIP Safety software for sercos and EtherNet/IP. This makes the software accessible to companies outside of the consortium so that they can implement their own products quickly and easily. IXXAT is currently the only supplier of CIP Safety software for sercos.

The unrestricted use on EtherNet/IP, in addition to sercos, as a potentially unsafe communications protocol is also possible thanks to the modular architecture of the CIP Safety protocol software. Adjustment layers within the CIP Safety protocol software simplify porting and adjustment to the various safe hardware and software architectures. Changes to the pre-certified CIP Safety software and a resulting elaborate post-certification are thus not necessary.

In addition to the adjustment layers required by CIP Safety on sercos, the software package offered by IXXAT also contains a safety manual and unit tests. Since all components are provided as an ANSI-C code, porting to specific safety platforms is possible with little effort. The supplied unit tests significantly simplify the required recertification of the CIP Safety protocol software on a safer target platform after porting.

IXXAT offers services for everything relating to CIP Safety software: from code introduction, to integration workshops, right through to device certification support. CIP Safety software can also be integrated into customer-specific hardware and software. ■

S Contact

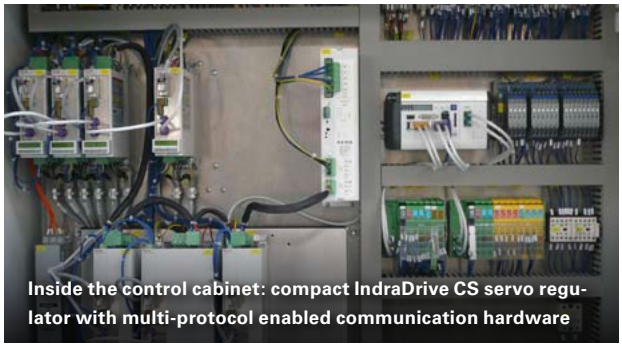
IXXAT Automation GmbH
Leibnizstr. 15
88250 Weingarten, Germany
Phone +49 751 561 46 0
Fax +49 751 561 46 29
www.ixxat.com

Brilliancy with Lower Energy

Paint systems by Dürr Systems are more economical thanks to Rexroth automation solutions

The automotive industry is embarked on two quests for lowering energy consumption – on the one hand in the performance of its products, and on the other during their manufacturing. In cooperation with Bosch Rexroth, the paint plant specialists Dürr Systems have contributed significantly to this goal by lowering the energy consumption of their painting robots by 30 percent. This was made possible in part because all components are optimally networked thanks to sercos.

When Dürr describes painting, commonly used terms include high-quality, efficient, flexible, and environmentally friendly. The German systems manufacturer is globally considered to be the leading provider of key technologies – documented by the fact that the majority of all manufactured cars are painted with Dürr paint systems. Literally seen on the surface, the competitive advantage in automotive manufacturing is initially defined by the paint quality, the resource and energy efficiency (as demonstrated by the paint and energy consumption per painted car body), the reduced emissions, as well as the stability and reproducibility of the process. The total cost of ownership also plays a part in the selection of suppliers, at least when it comes to losses during color changes and energy efficiency. In conjunction with its automation partners, including Rexroth, Dürr was able to lower the robots' energy consumption by a significant 30 percent in its latest generation of painting and sealing robots. This success in the servo drive technology results from a series of optimization measures.



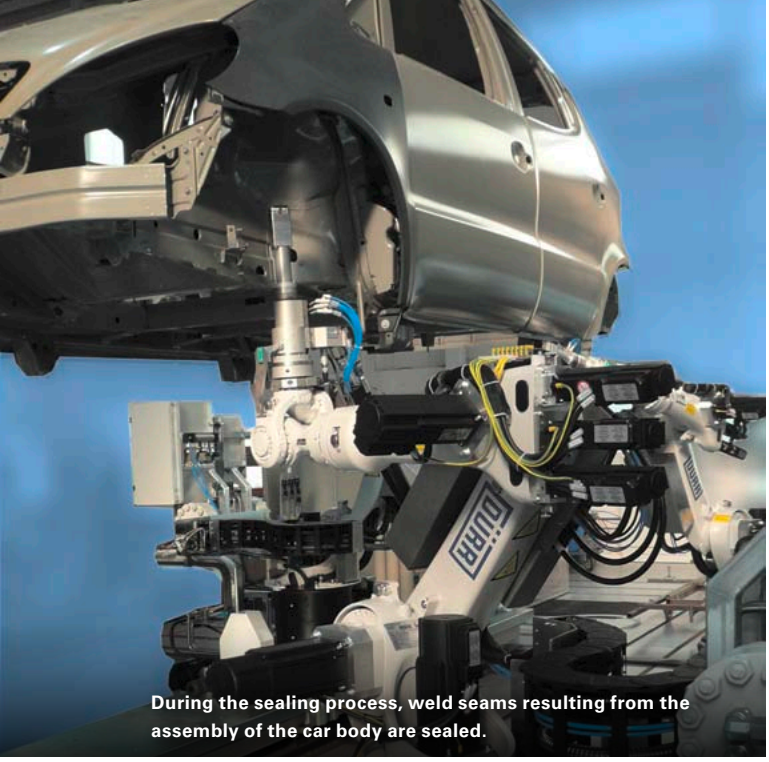
Inside the control cabinet: compact IndraDrive CS servo regulator with multi-protocol enabled communication hardware

Streamlined control architecture saves space

Manufacturing space is a precious commodity and costs money. Therefore, compact systems are a definite competitive advantage. A look inside the control cabinet shows space saving applied in practice – IndraDrive CS controllers with optimized dimensions and streamlined communication minimize the required space. Today, the motto of the fieldbus is "Turn three into one". Dürr implemented the entire motion and process communication of the robots with the sercos automation bus. Previously, this required three systems. "The close cooperation with Rexroth made the transition very easy for us and considerably simplified the control architecture," emphasized Dr. Hans Schumacher, Managing Director at Dürr Systems. With their newly developed multi-protocol enabled communication hardware, the servo regulators comply with the increased demands for openness and compatibility, with the ultimate aim of easier integration of components into the existing networks.

Pneumatics improve painting dynamics

The continuous real time sercos Ethernet system additionally controls the entire pneumatics for the atomizers in the painting robots as well as the electrically operated paint metering pumps. The application of the newly developed control valves, consisting of air flow regulators and speed regulators allowed cost, weight and volume savings. In terms of function, the current pneumatic solution provides increased flow coupled with decreased pressure drop, which improves the paint

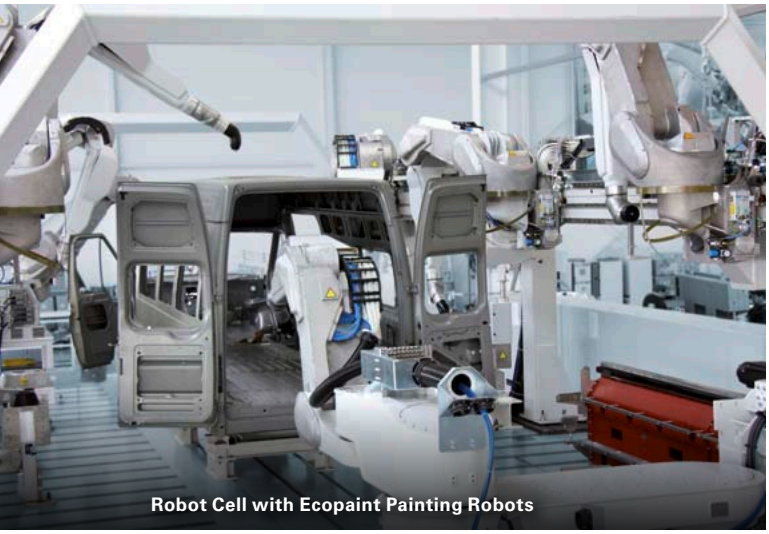


During the sealing process, weld seams resulting from the assembly of the car body are sealed.

dynamics overall. In terms of energy efficiency, the new generation can also score – the required pilot pressure was lowered from eight to six bar.

Link network lowers feed-in requirement

With the truly consistent use of the DC link system, Bosch Rexroth utilizes the energy that is generated when individual motors of the robot act as generators during braking. Instead of wasting the brake energy as heat through resistors, the link simultaneously feeds accelerating drives. The DC link is thus an effective method to lower both energy consumption and the required energy feed-in. The use of the DC link and central feed-in also has other positive ramifications. If the energy loss during braking is decreased, less heat is generated, reducing the thermal load on the production environment. In addition, behind the control cabinet door, Rexroth succeeded in optimizing design and functions to reduce the overall energy loss of the IndraDrive CS servo regulators that serve as robot axis drives. The same principle that applies to the large system also applies on a smaller scale – the electronic system in the control cabinet has lower thermal loss, lowering the investment and energy costs for the previously required air conditioning. Today a simple fan provides the necessary ventilation.



Robot Cell with Ecopaint Painting Robots

Conclusion

The application-specific design of the drive and control solution employed by Dürr is based on a system that allows treatment of the performance-enhanced components of the electrical drive technology and pneumatics as a single mechatronic system. Since all "actors" of this system are optimally adjusted to each other thanks to sercos, the total cost of ownership can be lowered without sacrificing quality and productivity.

Environmentally friendly paint application

With its so-called Green Paintshop, Dürr has succeeded in minimizing material and energy consumption and, in cooperation with its automation partners, to significantly lower electrical energy consumption. These measures ultimately result in sustainably reducing the environmental impact and production costs. In concrete figures, this means that the Green Paintshop only requires 500 kilowatt hours for painting a car body, whereas ten years ago nearly two to three times this amount was required. Emissions of volatile organic compounds are 70 percent less than ten years ago, while fresh water and waste water savings amount to around 60 percent. ■

S Contact

Bosch Rexroth AG
Phone +49 9352 18-4145
Fax +49 711 811 517-2107
Anfragen-PR@boschrexroth.de
www.boschrexroth.com

sercos III
Now Also Directly in the Encoder

CEV58M ES3 – compact absolute encoder with sercos III from TR-Electronic GmbH

The successful absolute encoders with Industrial Ethernet from TR-Electronic are now also available with sercos III. The CEV58M ES3 is the first absolute multiturn encoder that can be integrated directly into sercos III networks.

A 58 mm nominal diameter and approx. 65 mm housing length fit into numerous machine and system configurations. The CEV58M ES3 also fits into existing system constructions thanks to the modular flange concept and a large range of available shaft diameters and geometries. Connection takes place via M12 plug-in connectors. The small size leads to an even smaller net mass which reduces the susceptibility to vibrations and shocks.

Usually, they are supplied with 8,192 steps per turn and 4,096 absolute measured turns. Other resolutions are also possible: an advanced multiturn measuring range up to 32,768 turns or a high-resolution version, COV58M, with up to 21 bits within one turn. ■

S Contact

TR-Electronic GmbH
Eglishalde 6
78647 Trossingen, Germany
Phone +49 7425 228 0
Fax +49 7425 228 33
www.tr-electronic.de

sercos III
in the ServoOne Family

The ServoOne high-end servo system from LTi DRiVES GmbH meets the highest demands in terms of dynamism and smoothness. AC or DC fed controllers with rated currents of 2-450 A enable the optimum system to be configured for any power range. A variety of different cooling methods ensure high power density and optimum heat dissipation. DC supply modules with sinusoidal mains feedback convert surplus kinetic braking energy into electric power and feed it back into the supply grid. That is good for the environment and helps cut costs.

Thanks to its outstanding control properties and its versatile, high-quality encoder evaluation, the ServoOne is ideal for demanding synchronous multi-axis motion control applications.

With sercos III, the ServoOne enables users of existing sercos applications to upgrade easily to future-proof real-time Ethernet technology.

Expanded bandwidth and an advanced redundancy and hot-plug concept deliver higher precision and machine availability without losing out on tried and proven functionality.

Seamless integration of IP communication in conjunction with the DriveManager PC software offers all customers the choice between centralized and decentralized parameter-setting and diagnostics.

Functions such as IEC 61131-3 programming, pico-interpolation and observer structures greatly enhance the performance capability of the device and round off the added value achieved by switching to sercos III. ■

S Contact

LTi DRiVES GmbH
Gewerbestrasse 5-9
35633 Lahnau, Germany
Phone +49 6441 966 0
Fax +49 6441 966 137
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73079 Suessen, Germany
Phone +49 7162 9468-65
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www.sercos.de

Editing and design
KE-COMMUNICATION
Silberburgstrasse 50
72764 Reutlingen, Germany
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