

The Sercos logo, featuring the word "sercos" in a white sans-serif font with a red dot above the 's'.

Issue 02/2016

# news

the automation bus magazine

A hand is shown from the bottom left, reaching up to touch a large, glowing sphere. The sphere is composed of a complex network of white lines and dots, resembling a molecular structure or a data network. The background is a deep blue with a subtle gradient and some light bokeh effects.

# Connectivity with Sercos

Coherent and standardized communication

## **Sercos connectivity**

Sercos in connection with  
OPC UA

## **Application**

Tapping the potential of  
servo drives

## **Technology**

Hardened Sercos links at the  
speed of light



Dear readers,

With the OPC Unified Architecture (OPC UA) technology, a universal communication standard is now being established, which allows systems to network with each other, from the company level right up to the control or field level. OPC UA can not only be integrated into devices on any platform with various programming languages, but also any complex system can be completely described with the OPC UA information model.

Yet, although OPC UA is actually a communication standard, which ranges from the company level right up to the field level, there are two significant limitations. One is that OPC UA can use existing fieldbus and Industrial Ethernet systems only where there are no high-time and deterministic requirements with respect to communication. The other limitation is that OPC UA only defines how data is described and exchanged. The actual meaning of the data (semantics) is not defined.

For the above reasons, a promising challenge arises to illustrate the profiles and services on OPC UA defined by the fieldbuses and real-time Ethernet systems. Therefore, process and device data is available uniformly and across manufacturers, not only locally via the various fieldbus systems, but also via any superior network infrastructure via OPC UA. In this way, it is not just data exchange between machine peripherals and superior IT systems that is made easier. The requirements of Industry 4.0 regarding a semantic interoperability will also be supported.

On these and other developments and trends in the Sercos automation bus we report in the current issues of Sercos News.

Happy reading ...



*Peter Lutz*

Peter Lutz  
Managing Director  
Sercos International e.V.

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# Machine Communication Forum goes into its second round

Sercos International invited users and providers from the machine and plant engineering sector as well as device and automation manufacturers to the second Machine Communication Forum at the Marienberg Fortress, Wuerzburg, Germany, on October 13, 2016. The media partner was the SPS-MAGAZIN from the TeDo publishing firm.

Industry 4.0 and digitalization are profoundly and rapidly changing almost all areas of the economy, society, and daily life. In a partly evolutionary, partly disruptive manner digital technologies are changing value creation and innovation processes. Legislation is only partially prepared for this. The key-note address by Dr. Thomas Thalhofer, Noerr LLP, highlighted the legal framework of digital technologies as well as current challenges for business enterprises and provided hints as to what business must pay attention to.

In her leading lecture, Prof. Dr.-Ing. Birgit Vogel-Heuser of Technische Universität München discussed the dissolution of the automation pyramid and how machine communication in the smart factory can work. Her lecture touched on how the evenly oriented automation pyramid has transferred into the diabolio, where the information model between the production level and the MES level is being developed within the framework of Industry 4.0. Here, questions such as the following arise: What is to go into the control? What is to go into the HMI? And what is to go onto the superordinate levels? Which information models are required for smart

machines that support big data sensibly and benefit from the data analysis? How do we go from parameter-oriented to technology-oriented system operation? Her presentation provided answers to these questions.

Three trend lectures on the topics of TSN, OPC UA and which future markets could be of interest for machine engineering completed the morning.

The afternoon began with an exciting podium discussion in the fast-paced presentation format "five times five minutes" under the theme "The versatility of the Internet of Things: What is still a pipe dream, what is already reality?". Representatives of research and teaching, communication and IT experts, machine engineers, automation specialists, and users presented their view of the Internet of Things under the moderation of Mathis Bayerdörfer, editor-in-chief of SPS-MAGAZIN. Subsequently, all participants of the get-together of experts had the opportunity to offer contributions and ask questions in the discussion. After the panel discussion, the participants chose between various break-out sessions.



# New TWG structure at Sercos International

Since the foundation of the Sercos user group in 1990, 15 to 20 member companies continuously contribute to the further development of the Sercos technology. The technical work in recent years has been mainly focusing on the migration from a dedicated digital drive interface to an universal automation bus for diverse applications in machinery and plant engineering, as well as beyond.

With the implementation of Industry 4.0 concepts and the associated convergence of IT and automation, Sercos International is restructuring the Technical Working Groups (TWGs) and is bundling the relevant Sercos® topics in three working groups. This results not only in a fast and efficient reaction on market demands and technology trends. Furthermore, the drafting of the Sercos specifications and the inclusion of these specifications in international standardization will be accelerated accordingly.

The TWG Communication focusses on communication-related topics, such as the Sercos real-time protocol, the IP communication, and hardware issues. Associated with this working group are new technologies and trends, such as IEEE 802.1 Time-Sensitive Networks (TSN) and security. This TWG is headed by Florian Ruhhammer (Schneider Electric Automation) and Denis Janssen (Hilscher).

The TWG Devices is responsible for the maintenance and further development of the Sercos device profiles. This includes among others the generic device profile (GDP) and the function-specific profiles for decentralized I/Os, encoders, electrical, pneumatic and hydraulic drives, as well as

power sections of electrical drives. This TWG is headed by Dr. Andreas Selig (Bosch Rexroth) and Marcus Würr (Schneider Electric Automation).

The TWG Application and Tools deals with application-specific topics as well as with software tools. Application-specific topics include energy management (Sercos Energy), functional Safety (CIP Safety on Sercos), as well as the mapping of the Sercos technology to OPC UA. In addition, the working group is responsible for the coordination of the development of Sercos-related software tools (such as Sercos Conformizer, Sercos Monitor and Sercos Configurator). This TWG is led by Volker Lutz (Phoenix Contact) and Dr. Stephan Schultze (Bosch Rexroth).

The Sercos Steering Committee (SSC) is the superimposed body which coordinates the technical work in the TWGs in close coordination with the working group leaders, the Marketing Working Group (MWG) and the Board (BoD) of Sercos International. The SSC is headed by Peter Lutz (Sercos International).

## Coming up soon: Sercos V1.3.2

Sercos International will soon release the V1.3.2 specification update for the Sercos® III real-time Ethernet-based automation bus. Per requests by users and suppliers, the working groups of Sercos International have specified several profile and protocol extensions, which accomodate the continuously increasing application diversity and market acceptance.

The extensions are fully compatible with the previous specification so that a high level of standardization and the best possible interoperability of devices from different manufacturers can be ensured.

Among the innovations is a functional profile for power and control sections for electrical servo drives as well as a specification for the integration of subbuses such as IO-Link or AS-i.

## EVENTS 2017

### March

SIAT Industrial Automation Fair  
03/01-03/2017, Guangzhou - China

Automation Summit  
03/28-30/2017,  
Boeblingen - Germany

### April

Hanover Fair 2017  
04/24-28/2017, Hanover - Germany

### May

Sercos Conference Italy  
Date and location tbd

Industrial Automation  
05/10-12/2017, Beijing - China

SPS IPC Drives Italia  
05/23-25/2017, Parma - Italy

### IEF

Date and location tbd - Italy

### 19th PlugFest

Date and location tbd  
Germany

### August

Automation  
08/09-12/2017, Mumbai - India

### ION Industrial

Open Network Roadshow  
08/24 + 08/29/2017,  
Tokyo/ Osaka - Japan

### October

Machine Communication Forum  
10/17/2017, Wuerzburg - Germany

### 20th PlugFest

Date and location tbd - Germany

### November

Industrial Automation Show  
Date tbd, Shanghai - China

### SPS IPC Drives

Date tbd, Nuremberg - Germany

### December

System Control Fair  
Date tbd, Tokyo - Japan

JULY						
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26						1
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28	9	10	11	12	13	14
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AUGUST						
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NOVEMBER						
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44						1





Interview



Peter Lutz  
Managing Director  
Sercos International e.V.

# Sercos in connection with OPC UA

Peter Lutz, Managing Director Sercos International, talks about how Sercos connects with OPC UA.

**How do you assess the future role of OPC UA in industrial production 4.0?**

**Peter Lutz:** OPC UA plays a very important role in advancing the convergence of IT and automation technology, thus enabling the consistent exchange of information between the different control levels. From a technical perspective, OPC UA is characterized by the fact that it contains both mechanisms for data exchange and an information model which allows the structure and semantics of the information exchanged to be defined. In addition, OPC UA is standardized on an international basis and has very wide acceptance from manufacturers and users worldwide.

*"OPC UA is standardized on an international basis and has very wide acceptance from manufacturers and users worldwide."*

**How will they regulate the cooperation between Sercos and OPC UA in detail?**

**Peter Lutz:** The OPC UA Companion Specification, which was approved in November 2015, describes how the Sercos® information model is mapped onto OPC UA, making the functions and data provided by Sercos devices accessible via OPC UA. Thus, not only is data exchange between the machine components and superordinate IT systems simplified, but the requirements of Industry 4.0 with respect to semantic interoperability are also supported. The use of Sercos' multi-protocol capability is particularly interesting. This allows the OPC UA and Sercos protocols to be used in a common, uniform Ethernet in-

*"Protocols can coexist and are not tunneled in a Sercos network."*

frastructure without impairing the real-time characteristics of Sercos in the process. Since protocols can coexist and are not tunneled in a Sercos network, consistent access to the machine components is possible via OPC UA even without continuous Sercos real-time communication.

Within the framework of the machine initiative, Sercos International also cooperates with the ODVA and the OPC Foundation to mutually develop concepts for an optimization of machine integration (OMI). That initiative deals with the development of a machine information model that is mapped onto OPC UA, Sercos and CIP in order to enable protocol-neutral access to machine-related information, such as identification, machine status, diagnosis, etc.

**Will the standard enable the transmission of OPC UA data in real-time or not? Is OPC UA data transmission in real-time even necessary and/or sensible?**

**Peter Lutz:** The objective of the OPC UA Companion Specification for Sercos is to make process and device data defined in the Sercos specifications available not just locally via the Sercos real-time bus, but also via any superordinate network infrastructure via OPC UA, in an uniform and cross-manufacturer manner. In this context, real-time capability of OPC UA is not necessary, as the real-time communication is provided by the Sercos automation bus. Of course, application scenarios are

possible in which a real-time capability of OPC UA is necessary, for example in machine-to-machine communication or in the linking of process-related machine periphery via OPC UA.

**How does your organization assess the coming real-time TSN Ethernet standard and what strategy does it pursue regarding it?**

**Peter Lutz:** For the first time, Ethernet TSN makes time-controlled

transmission of real-time critical messages via standard Ethernet components possible. An exciting and indicative question is now whether and how extremely fast real-time applications can be realized with Ethernet TSN and how simple or complex use of this new technology will be.

The Sercos TSN task force, set up in November 2015, is studying the key features of the future IEEE 802.1 Time-Sensitive Networks (TSN) real-time standard, especially regarding the achievable performance (data throughput, processing times, and real-time characteristics), as well as the required network management with reference to various network characteristics. The results will then be analyzed in order to derive possible implementation and migration concepts for various application scenarios.

*"That initiative deals with the development of a machine information model that is mapped onto OPC UA."*

*"For the first time, Ethernet TSN makes time-controlled transmission of real-time critical messages via standard Ethernet components possible."*



# Sercos connectivity: Integration of subbuses using the example of IO-Link

The vertical communication in the context of Industry 4.0 and Internet of Things (IoT) captures more and more the sensor/actuator level. Today, sensors and actuators, such as temperature probes or signal lights, are typically connected via a binary or analog link. In future, these devices will become more and more intelligent, which facilitates the implementation of decentralized automation concepts.

From a topological and functional viewpoint, the sensor/ actuator interfaces, such as AS-I or IO-Link, are to be viewed “below” the current, established fieldbuses. The integration is done by using appropriate fieldbus gateways. This approach is a significant advantage for the sensor and actuator manufacturers, as fieldbus gateways for almost all

real-time Ethernet solutions are available. Consequently they can offer a device with only one single and unified digital interface.

For Sercos® a generally valid specification for the integration of IO-Link into Sercos was created, which covers all

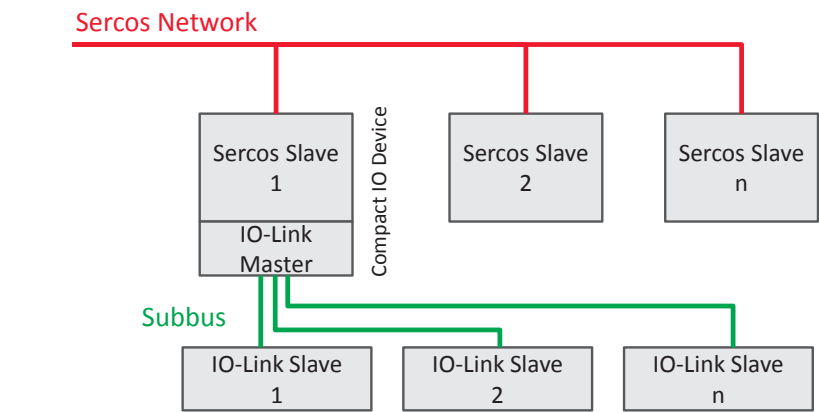


Image 1: Gateway as a stand-alone device

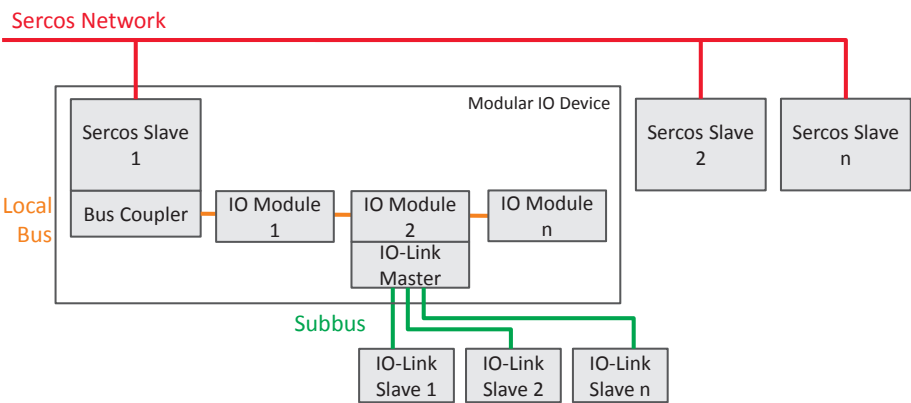


Image 2: Modular device with an integrated gateway

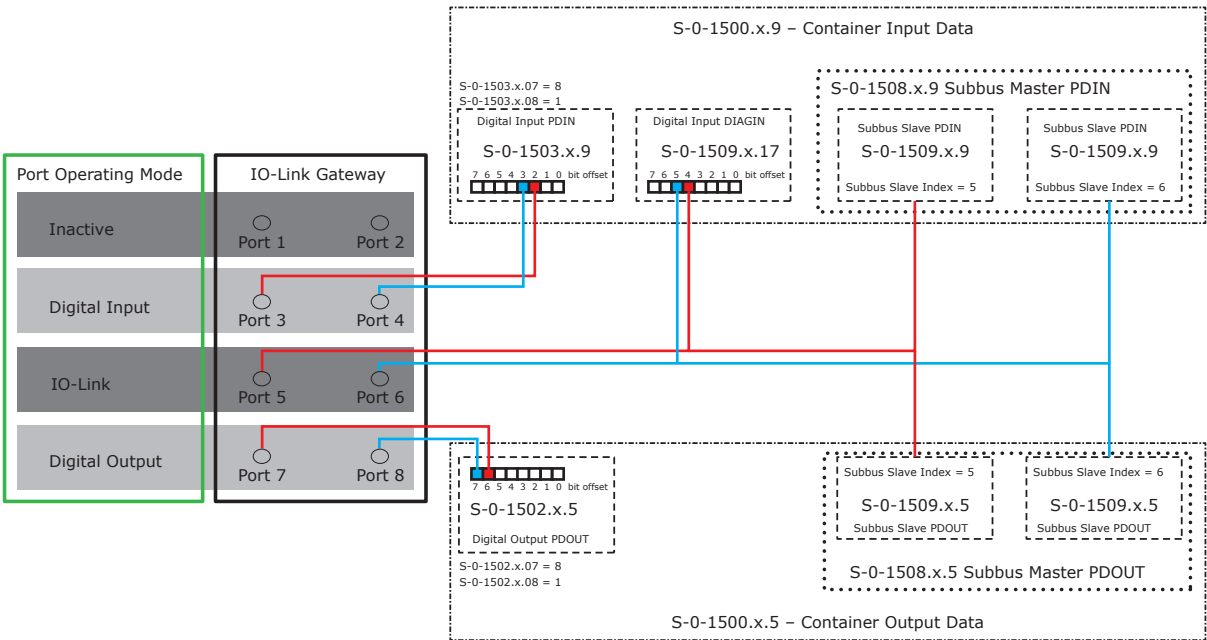


Image 3: Mapping of the cyclic data transmission

necessary use cases comfortably and in a manner appropriate to the user. Major importance was placed particularly on both the diagnosis and parameterization of the IO-Link master ports in the gateway and on handling in the case of a gateway exchange.

The device with the gateway functionality can be a stand-alone device (image 1), or it can be part of a modular device (image 2).

The specification for the IO-Link integration (see image 3) contains the functionality during operation (cyclical data and acyclic data transmission, automatic parametrization in case of device replacement), the functionality during start-up (device identification of all connected IO-Link

devices, coordinated bus start-up of IO-Link with Sercos), the functionality of the configuration (port configuration of the IO-Link master ports, configuration of the IO-Link devices), the functionality in case of diagnosis (replacement value behavior in error case, diagnosis of the IO-Link devices and of the IO-Link master ports).

The two-tiered nature of the specifications makes it easy to integrate – besides IO-Link – other subbuses (image 4). When changing the subbus, the Sercos mechanisms remain identical for the user. Furthermore, the application in the control device only changes little as the data exchange with sensors and actuators is based on Sercos mechanisms, which every Sercos control today can handle.

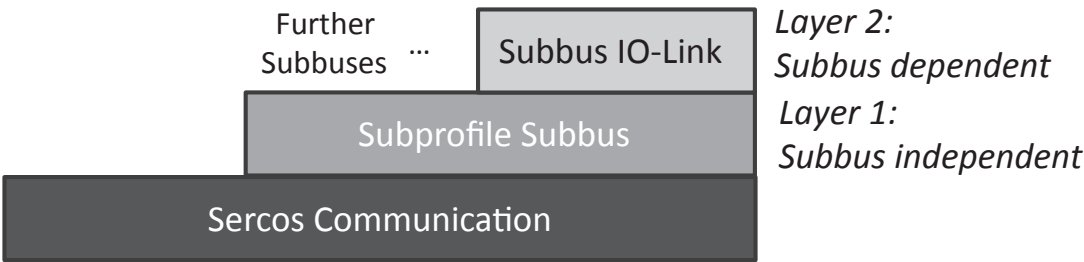


Image 4: Two-tiered subbus integration



# Standardized device functions in the context of Industry 4.0

Everyone is talking about the Internet of Things, which is seen as the technological basis for the implementation of Industry 4.0 concepts. In this context, interesting questions are: What influence does the Internet of Things have on additional development of today's bus systems, and what contribution could these technologies make with regards to consistent and uniform communication?

The requirement for an economical and flexible use of a universal communication network in automation, apart from the technical characteristics, is the highest possible level of standardization. However, unification must not only relate to the physics and the protocol, but must also include the device functions, because these standardized functions determine the semantics of the data provided via the network, in the form of profiles. Uniform semantics are vital to evaluate inter-manufacturer and inter-product data or execute functions.

## Introduction

Classic control solutions are identified by the fact that bus systems which are significantly different in physics, protocols, and handling are used independently in automation applications.

The consequence is that significant additional effort arises for the user, because various network technologies must be implemented and supported in the equipment. Looking at the total cost of ownership, apart from material and installation costs, it is primarily the cost of training, maintenance and service that make such heterogeneous network structures suboptimal solutions. Also regarding consistent communication, it is a significant disadvantage that data is not provided in an uniform format and with uniform semantics. This makes the implementation of innovative Industry 4.0 concepts significantly more difficult.

Only consistent standardization and simple rules can help, so that systems can be adapted without problems and without high costs. The more participants who adopt the principles are connected to the network, the greater the benefits for everyone. The so-called network effect explains the rapid proliferation of the Internet, after the original academic network was opened up to everyone.

## Consistent standardization with Sercos III

Ethernet-based Sercos® III, with its high level of standardization and guaranteed backwards compatibility, enables

problem-free plug-and-play combination of devices from various manufacturers. Due to the functionally oriented classification of the devices in combination with uniform and consistent semantics, Sercos not only facilitates the engineering and diagnosis for various types of devices, it also supports uniform provision of production-relevant data, in order to use that data for process monitoring, network diagnosis, energy management, or preventive maintenance (image 1).

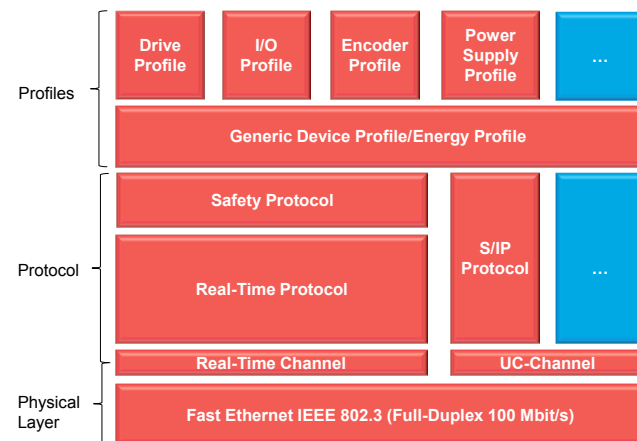


Image 1: Sercos III as a universal automation network

## Uniform profile as the requirement for interoperability

In the last 25 years, the focus of the Sercos device profile has been on standardized, tried-and-tested worldwide communication for electrical servo drives. It includes a large established scope of functions, due to its diverse use in a variety of application fields. In the course of transferring this device profile to Sercos III, the underlying device model has been expanded and generalized; so that apart from pure-bred drive, I/O and control devices, hybrid devices that support various applications in one device are also supported.

At the same time, additional development of the device profile specification has been driven forward by a consistent basic structure for all device types, from a simple actor or sensor right up to complex multifunctional devices.

## The device model

The Sercos slave device structure was defined to have a viable basis for all conceivable device types. The logical structure of a Sercos device primarily consists of one or several independent technological functions; for example drive, I/O or cam switch functions. These functions (resources) are allocated to a so-called subdevice, which includes the fundamental administration functions for initialization, parameter management and diagnosis, and covers its own parameter addressing space.

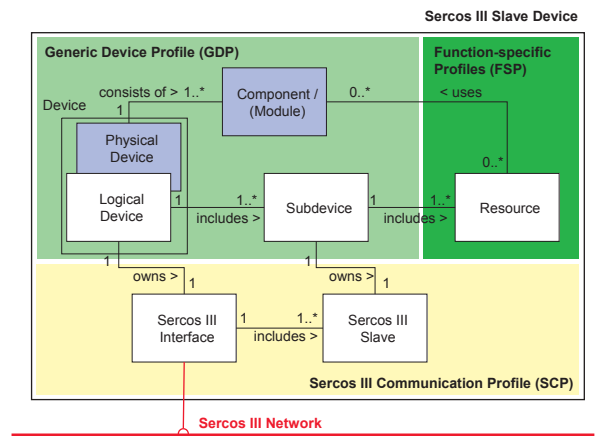


Image 2: Slave device structure

Device-independent functions are summarized in the generic device profile (GDP). Each subdevice is allocated to exactly one Sercos III slave, via which the Sercos-related communication accesses are organized. The communication-related functions of a device are grouped in the Sercos Communication Profile (SCP; image 2).

Therefore, several subdevice slave pairs can be included in a Sercos device with a Sercos III interface. This is the re-

quirement for forming more complex devices, by combining various and, if necessary, multiple existing device functions. While simple Sercos devices made from one slave-subdevice and one resource exist (image 3a, b, d), complex devices can include several of these units in manufacturer-specific combinations (image 3c).

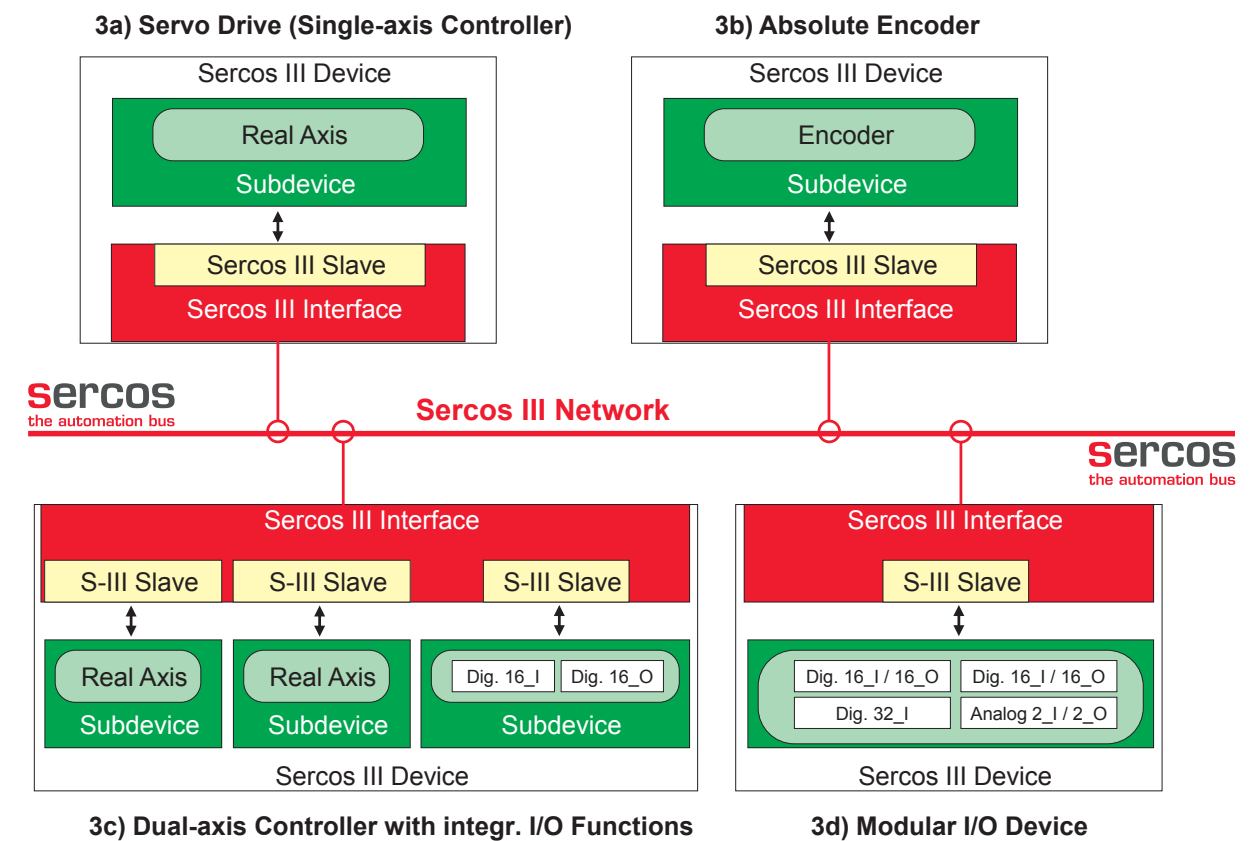


Image 3: Construction of typical Sercos III devices



Device-independent profiles

The device-independent profiles are the Sercos communication profile, the generic device profile and the energy profile. The table on the right gives an overview on the meaning and content of each of the three profiles.

Function-specific profile

In the function-specific profiles, called Function-specific Profile (FSP), the device-specific functions are managed. Currently, in Sercos III the FSP's "Drive", "I/O", "Encoder", and "Power Supply" exist (see table 2).

The I/O FSP is therefore suitable for both compact I/O peripheral devices with a predefined scope of function, and modular I/O devices, where the input/output modules can be put together arbitrarily, and the connection to Sercos is provided via a central bus coupler. The Drive FSP was additionally developed on the basis of the original Sercos drive profile, adding further actor physics and drive types. These two profiles are supplemented by a functional profile for absolute and incremental encoders, and a functional profile for performance and control of parts of electrical drives.

Summary

With Sercos III, a universal real-time Ethernet solution is available, which not only covers quick and real-time capable communication in production, but also supports vertical

Profile	Functions/components (selection)
Sercos communication profile (SCP)	Addressing, communication timing, connection configuration, network diagnosis
Generic device profile (GDP)	Identification, state machine, device diagnosis, archiving
Energy (Energy profile)	Energy-related parameters, states and transitions to control the energy consumption of machines & machine periphery (idle times, partial load operation, partial machine operation)

Table 1: Overview of the device-independent profile of Sercos III

integration, where process and production-relevant data is provided with an inter-manufacturer semantic. Thus, not just data exchange between machine peripheries and superior IT systems is made easier, but the requirements of Industry 4.0 regarding semantic interoperability are also supported. The profile defined by Sercos can be handled on OPC UA for example or provided via a web server. The process and device data defined in the Sercos specifications are therefore not only available locally via the Sercos real-time bus, but also via any superior network infrastructure via OPC UA or web services, in an uniform manner and across multiple manufacturers.

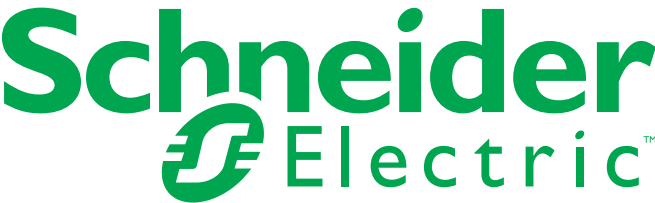
Profile	Devices (selection)	Functions/components (selection)
FSP Drive	Servo drives, frequency converters, hydraulic drives, pneumatic drives	Operating types (situation control, speed control, torque control, positioning/interpolation mode), references, measuring probe, scaling
FSP I/O	Compact I/O components, modular I/O components with bus coupler	Digital and analog components, counter components, secure input/output components, communication components for mailbox-oriented data exchange, and subordinate subbuses, e.g., AS-Interface or IO-Link
FSP Encoder	Incremental encoder, absolute encoder	Position with/without scaling, signal preprocessing, parametrization, monitoring functions
FSP Power Supply	Performance and control of parts of electrical drives	Operating mode control, monitoring functions

Table 2: Overview of the functional profiles of Sercos III

# Schneider Electric's PacDrive 3 technology

Schneider Electric's PacDrive 3 technology incorporates the advantages of the latest technologies into a proven concept for controlling modern production, assembly, and packaging machines with a motion/robotic component. PacDrive 3 unifies PLC, IT, and motion functionalities on a single hardware platform and is one of four hardware platforms of MachineStruxure, Schneider Electric's solution package for general machinery applications. PacDrive 3's scalable controller performance allows economical automation of applications ranging from small systems with only a few servo axes to high-performance solutions with up to 130 servo axes including multirobot applications.

With Sercos®, Schneider Electric has created a fully Ethernet-based communication solution for PacDrive applications. Enabling communication with both drives and field devices, Sercos also smoothes the way for the integration of safety automation: In PacDrive 3, standard communication and safe communication merge into one – Sercos is the basis. The Safe Logic Controller Modicon SLC permits programming of the safety functions, the Modicon TM5/TM7 safe I/O system is connecting safety signals to the SLC.



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## Tapping the potential of servo drives

Somic, an innovative specialist in end-of-line packaging machines, has long advocated the use of integrated servo drives. The benefits produced by these drives go far beyond the ability to create machines with modular mechanical, electronics, and software functions. The company has also come up with some interesting ways to tap into even greater potential benefits using integrated drives from Schneider Electric.

One of the toughest challenges for builders of packaging machines remains the fact that designing these machines is a highly individualized process: short product life cycles in consumer markets and the special role that packaging plays in the marketing process translate into a constant flow of new packaging types. Packaging machine builders need to incorporate all of these design ideas into the technical production process, while at the same time reducing the time needed for development and commissioning. The goal of machine building is therefore to bring serial machine production and custom machine building as far as possible under a single umbrella.

### Consistent modularization – the first step

Manfred Bonetsmüller, Somic's founder and managing director, has mastered this balancing act with his company. Early on in the emerging field of mechatronics, which arose with the growth of servo technology, Bonetsmüller

### Comment



*"For ten years now, integrated servo drives from Schneider Electric have formed the backbone of our modular systems and our engineering design."*

*Manfred Bonetsmüller, managing partner of Somic Verpackungsmaschinen, Amerang*

saw an answer to the challenges he faced: "Somic developed a modular system that divides end-of-line packaging machines into 'functional environments'. Products need to be collected, grouped, and packed into cartons. The 424 cartoner series, for example, comprises three, four, or five functional groups, which are further subdivided into categories such as machine frame, collection, cartoning, sealing,

and lidding." This modular structure provides appropriate performance for every machine size and output level, and for any number of repetitions.

Bonetsmüller has worked with Schneider Electric for 14 years, having recognized Schneider Electric as a company that closely shares his vision of the mechatronics approach and the principle of modular machine construction as it relates to automation.

The critical technology in this process is the PacDrive automation solution and the principle of integrated servo drives implemented in the Lexium 62 ILM series.

The drive electronics and the servomotor together form a single unit, and a flexible networking concept connects all of the drives with the central shared power supply and the controller. The networking concept includes distribution boxes and double-ended, pluggable hybrid cables, combining power supply and Sercos® data communication in a single cable.

The Sercos bus comes from the PacDrive controller and is led into the shared power supply together with the power supply for the drives and the motor feedback signal through a connection module. This module has a single hybrid cable that runs from the control cabinet to the machine's first distribution box. From that point, the cable branches off to all integrated servo drives in tree and line structures or using a daisy-chain topology.

### Continuing the modularization concept in software

Somic uses the Lexium 62 ILM to integrate the complete servo drive technology in every mechatronic machine module. It can be inserted into the automation solution for an in-

dividually configured machine with only one cable per plug for every module, without any effect on the contents of the control cabinet. The cabinet continues to contain only the central PacDrive controller for all machine functions and the central power supply for the machine's entire servo drive solution. This concept not only maximizes modularization, it is also highly energy-efficient: All of a module's drives are integrated through coupling in the servo solution's bus. The decentralized design also eliminates the need for climate control within the control cabinet.

Approximately seven years ago, Somic completed the next step toward full software modularization, with its implementation of Schneider Electric's template-based software concept. This offers an alternative to traditional programming with Application Function Blocks (AFBs), which is also possible with PacDrive, and allows designers to rapidly integrate machine functions: A master program, with components for machine operating modes, diagnostics, and handling of exceptions, creates a framework for assembling the machine program using preprogrammed and tested IEC-61131-3-compliant software modules. Each component can be customized and enhanced with company-specific know-how.

Thanks to this modular software approach, machine modules can now form a single closed unit, not only for mechanics and electronics, but also for software. This allows Somic to create standardized machine programs that include every conceivable machine configuration for a given model. When the unit is commissioned, the controller performs a hardware scan via the Sercos bus, recording all of the modules active in the machine and activating the appropriate program parts.

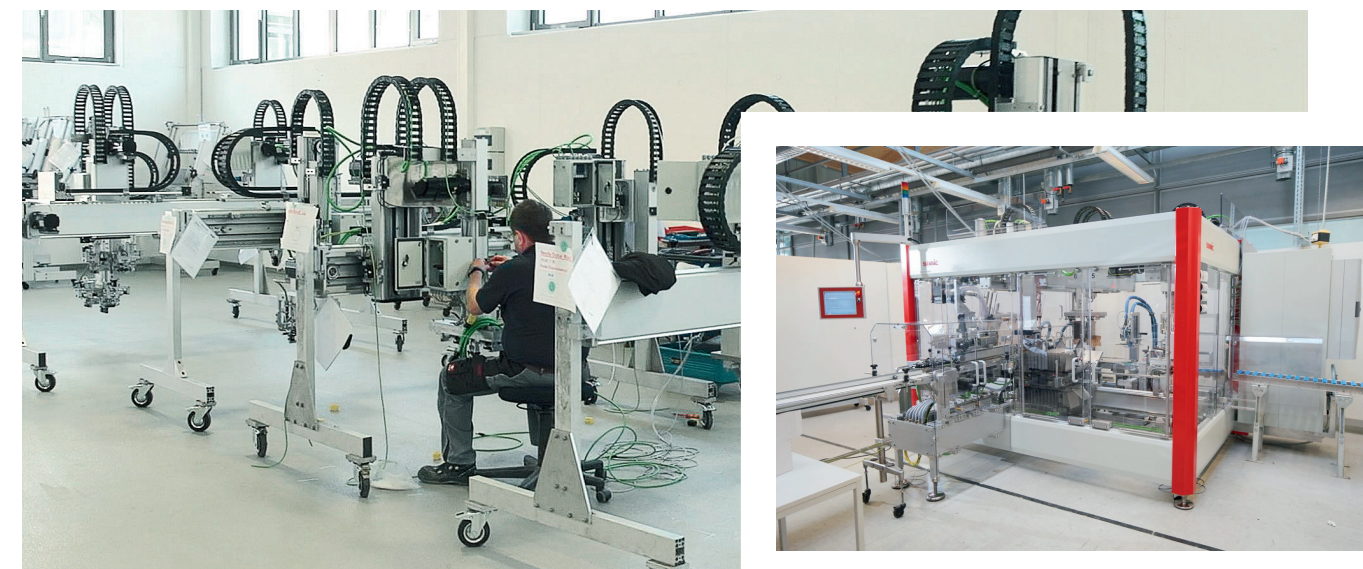


Image 1: Mechatronic modules with complete modular servo drive technology on rollable assembly and transport frames

Image 2: Modular end-of-line packaging machine: Functionality is enhanced through customized configuration of mechatronic units within the machine frame.



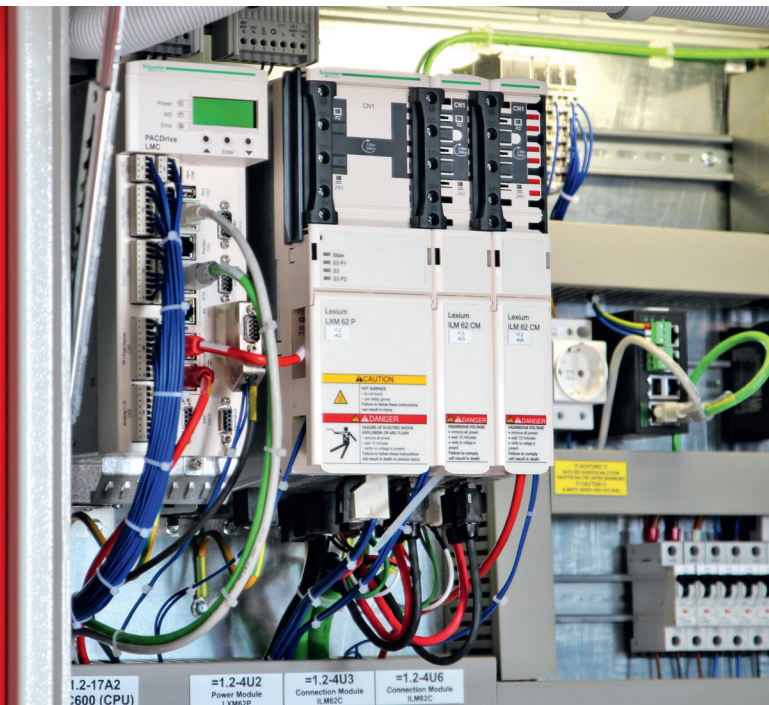


Image 3: The heart of each machine: the PacDrive controller (left), the shared power supply for the machine's entire drive solution on the right next to the controller, and (in this case) two modules for connecting the networked servo drives to the controller and the shared power supply

#### Servo technology replaces asynchronous motors

With this idea, the potential of an integrated servo drive solution would seem to be exhausted – but not for Somic: Somicon, its wholly-owned subsidiary for conveyor solutions in packaging applications, is now also equipping its conveyor solutions with servo technology. Instead of classical drive solutions based on asynchronous motors (AC motors) and variable frequency drives, Somicon is designing modular conveyor belt units with complete on-board drive solutions based on integrated Lexium 62 ILM servo drives – just like Somic's machine modules. Here also, a cable with a plug connection forms each module's interface to the complete solution.



Image 4: The drive electronics for the Lexium 62 ILM piggyback on each servomotor, saving space in the control cabinet.

According to Bonetsmüller, a cost analysis of the complete solution (drive components, engineering, integration in the complete solution) refutes the suspicion that servo technology would make conveyor units more expensive: "Our studies have shown that overall costs are more or less comparable to those of solutions using traditional AC motor-based solutions. At the same time, however, they provide the advantages of fully integrated system communication and diagnostics, complete software integration into the machine program, and thus ultimately much greater flexibility." Servo drives also meet energy efficiency class IE3 requirements. This makes conveyor solutions with servo drives a viable solution for meeting future energy efficiency mandates.

Somic itself has provided input for further innovations based on the Lexium 62 ILM technology. "In the future", predicts Bonetsmüller, "we will significantly increase the number of servo drives installed in each machine. This applies above all for small servos with a 40 mm flange width. We want to incorporate these motors in our machine solution based on Lexium 62 ILM."



Image 5: Innovative approach: Conveyor system with servo technology instead of asynchronous motors controlled by variable frequency drives: full integration into the motion control unit's communication and software solution, engineering advantages, and much greater flexibility offset higher product costs on the purchasing side.

#### Remote motor electronics allow greater range of motors

Schneider Electric responded to this idea with a new spin on the concept of integrated drives: Three servo drives with a structure similar to the electronics of a Lexium 62 ILM were combined into a single assembly with an IP67 safety standard, including all connections and heat sinks. These can be locally mounted on the machine chassis and seamlessly integrated into the Lexium 62 ILM networking concept. This version, designated as the Lexium 62 ILD, opens the door to incorporating all PacDrive-compatible servo motors (including the Lexium SHS stainless steel series) for cabinet-free automation. It also allows the control of asynchronous motors with servo drives, even for the local Lexium 62 version.

Bonetsmüller sees two important aspects to including smaller servo motors in the decentralized drive solution: Firstly, drives mounted on mobile module parts can be as small as possible: reducing the moved mass positively influences the achievable dynamic range and also directly influences machine speed. Secondly, the Lexium 62 ILD is a further step toward greater energy efficiency. As Bonetsmüller notes, "Because the Lexium 62 ILD allows us to use the entire motor range, we can more precisely match the motor output to each drive solution's individual load."



Image 6: Somic provided the idea, and Schneider Electric took up the challenge: In the future, the Lexium 62 ILM integrated servo drive concept will be supplemented with fully compatible, remote IP67 units for multiple motors, opening up the possibility of decentralized, cabinet-free automation for the entire range of PacDrive-compatible servo motors (and asynchronous motors as well!).

sps ipc drives 2016  
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Fieldbus

## CODESYS® Sercos

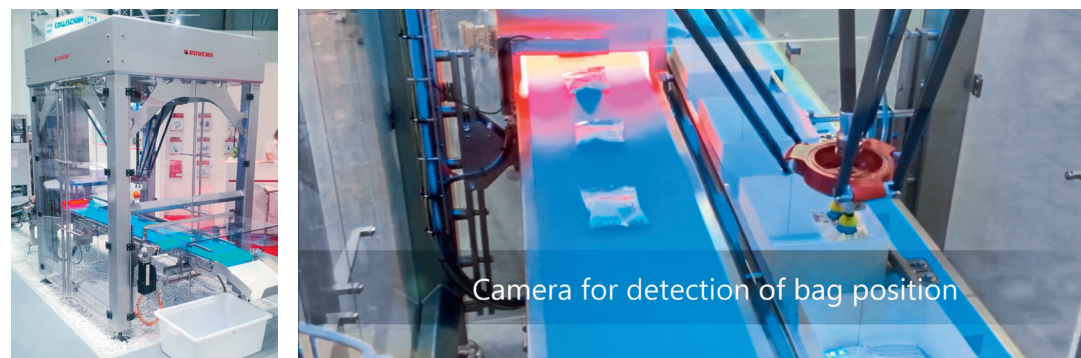
- Configurator and portable protocol stack seamlessly integrated into the market-leading IEC 61131-3 automation software
- Driver for Sercos master card available
- Diagnostics in the development system and the controller application



# Sercos machine vision for packaging machines

The number of manufacturing processes which use machine vision to help control production flows or drive subsystems continues to increase. To keep pace with this trend, machine vision systems require a high-speed interface capable of supporting equipment control applications.

Image 1: Rovema develops new pick-and-place robot with built-in Vision & Control machine vision components.



Vision & Control is very aware of this trend and offers intelligent cameras and multicamera systems with a Sercos® real-time Ethernet interface. In partnership with packaging machine manufacturer Rovema, Vision & Control has developed an innovative Sercos-based solution for shelf-ready packaging of various products.



Image 2: vicolux® lighting systems equipped with power LEDs deliver bright, high-contrast images for reliable image analysis.

Rovema packaging lines have a modular design. The machine vision module used for position detection of pillow bags on an infeed conveyor is based on a similar design approach. The machine vision module sends position data for the packaged products to the picker module. The BVC180 pillow bag machine in combination with this module forms a compact packaging line which has no control cabinet. Elimination of the control cabinet is a welcome feature for the many customers who may want to add other highly-integrated units.

Candy in particular, which comes in bags with many different shapes, colors and textures, is a real challenge for machine vision. A light tunnel with diffuse, shadow-free internal lighting eliminates reflections and susceptibility to stray light.

The vicolux® smart light emits red light to complement the blue background, maximizing bag contrast and ensuring reliable detection of the bags. The DLC3005 lighting controller guarantees that the lighting performs reliably under varying ambient conditions.

Efficient programming of the pictor® T303M-SC machine vision system makes it possible to detect a minimum of 180 bags per minute. The vcwin® pro programming environment can be used for intuitive generation of test programs with powerful machine vision functions. The end user can make modifications on their own to accommodate different bag designs. The compact pictor® T machine vision unit performs image capture, position and orientation detection, as well as transmission of the data to the picker module on the Sercos automation bus.

Integration of the Sercos real-time Ethernet interface into Vision & Control machine vision systems establishes a direct interface to the system controller. This approach supports distributed control architectures, reduces service effort and cost and saves space. The Sercos bus guarantees maximum performance and precision for synchronized communications in automation environments. In addition, standardized device and function profiles reduce the effort needed for commissioning.



Image 3: pictor® series smart cameras are ideal for compact automation systems.

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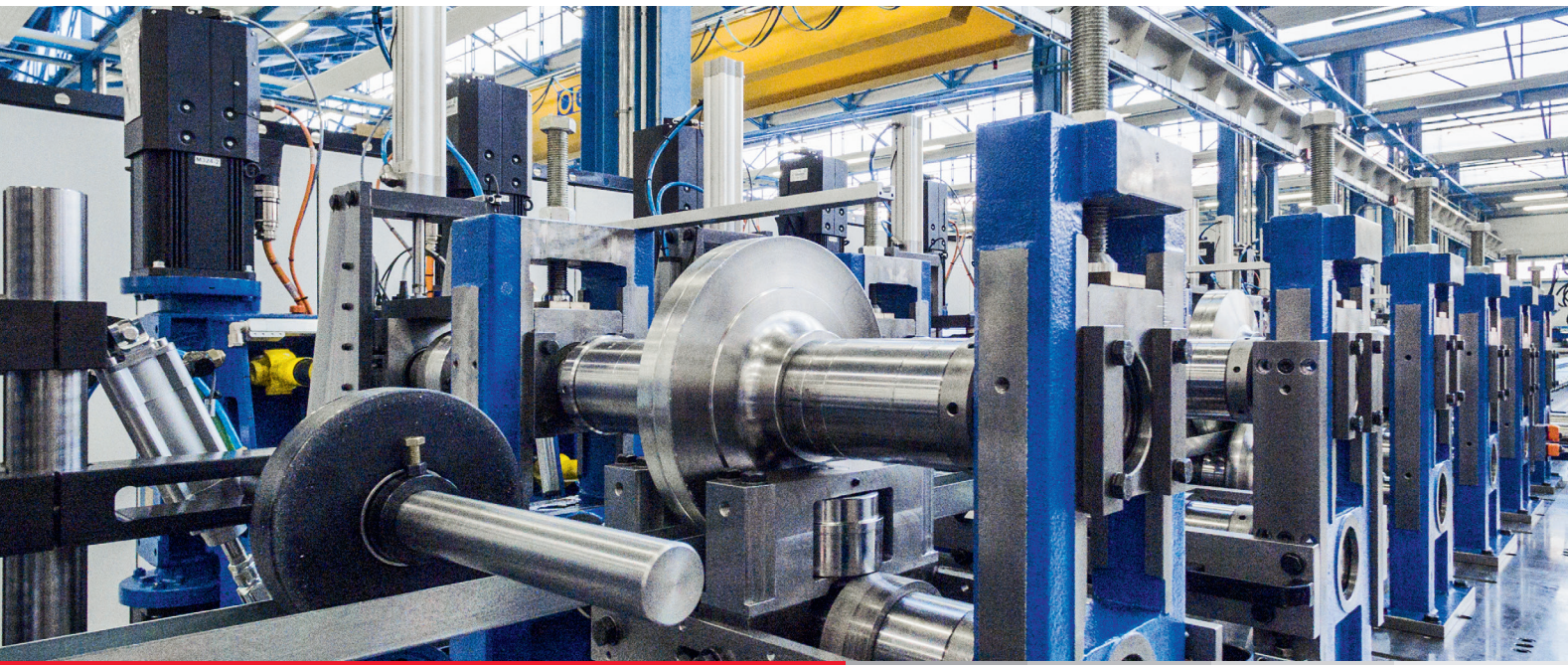


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The Drive & Control Company

**Rexroth**  
Bosch Group





## Gasparini S.p.A. raises the versatility standards of profiling systems, with the aid of Bosch Rexroth

A new line for profiling laminated sheet metal, combining quality and reliability with high levels of productivity, efficiency and flexibility. This was the challenge for Gasparini S.p.A., a leading company in the field of sheet metal deformation since 1952.

The new production line, 65 m long and 6 m wide, able to work from 2 to 40 m of sheet metal per minute and produce metal profiles with a 500 mm development, measuring 300 x 100 mm and 5 mm thick, is now ready to leave the new plant in Mirano (in the province of Venice) and be installed at the premises of the customer – a German firm specializing in the subcontracting of profiling and requiring a system with exceptional production versatility features.

A challenge taken up by Gasparini S.p.A., that has always stood out for its production philosophy hinging on the creation of one-off systems for its customers, to meet specific and often out-of-the-ordinary needs. This is also the basis for the collaboration with Bosch Rexroth (begun in the sphere of hydraulics and linear actuators in the early

2000s), which has recently seen the adoption of electric drive and control solutions.

The punching, profiling and cutting line project required drive and control systems for the various work phases, so the contribution of Bosch Rexroth was important during the development stage when defining the control system architecture. The Bosch Rexroth application team, specialized in metal forming, sustained the Gasparini engineering for the sizing of the electric drive systems and the choice of motion controls with special functions for resolving the many technical needs of a complex profiling line.

Thanks to this winning partnership, customer satisfaction was guaranteed by a line designed to supply a versatile

system able to produce a vast array of profiles whilst minimizing production costs and investments in equipment. The line is made up of processes necessary for obtaining highly differentiated end products and ensures optimum automation, optimum quality standards, and optimum production performance.

The system combines a number of particular features relating primarily to the management of the coils, especially the loading cradle with precision tilter for facilitating the machining of high-resistance steel, the automatic belt joint system for coil changes with minimum operator intervention, and the high-performance and high-precision electronic feed unit with the latest control system.

The following punching system, consisting of three electrically activated hydraulic presses with a force of 80 tons, combines the strength and versatility of the hydraulic press with the versatility of an electric press. This combination meets the varying requirements of the profiles to be produced as, in this process phase too, there is the possibility to optimize punching times with different borings and steps.

The heart of the plant is the profiling system with its automatic equipment unit change. The profiling system offers adjustment of the upper and lower shafts and an independent drive system for each profiling machine axis. It uses Bosch Rexroth's MLC65 motion control – a system that, thanks to the use of the Sercos® real-time automation bus, can manage electric shafts, electronic cams and independent positionings for up to 64 axes. This means the rotation speed of each step is optimized to suit the needs of the process and the equipment. A control on each single step guarantees top production and qualitative efficiency for each different profile created, as the speeds can be parameterized on the basis of the profile geometries. Within the profiling system, it's possible to assemble flexible moulders, traditional moulders with various diameters, start-stop moulds and mobile shearing units to extend the range of possible machining operations.

The mobile cutting system is installed downstream from the profile. It can be fitted with a disc saw and a cutting mould with or without off-cuts. During flying cuts, carriage movement is managed by a special function integrated in the Rexroth IndraDrive electric drive. The IndraMotion for metal-forming packages combines the flying shear process (a ready-to-use solution, the result of over 30 years of Rexroth application experience in sheet metal machining). The line is completed with the automatic unloading

system for profiles up to 12 m long, allowing the creation of a buffer that improves efficiency during pack handling operations.

In short, the line permits a wide range of production possibilities with the integration of different machining processes. In addition, its design allows considerable scope for future developments in terms of the products that can be created and the machining operations requested. Compared with traditional plants, it brings together smart management systems in every area, and hence avoids any prevailing operations that affect the functioning of the others.

With its significant know-how and innovation potential, Gasparini has been able to provide a tailor-made system able to resize according to the needs of the purchaser and the applications it will be used for. This is one of the company's characteristic traits, based on a "tailored" concept of the plant in which the design begins from the specific needs of the customer, and the task of the technical office (with a staff of 40 design and engineering specialists) is to produce a made-to-measure system where up to 80% of the design is personalized.

Gasparini's strength lies in its ability to act as a real partner for the customer, working together to examine the best solution for the specific requirements. A fundamental aspect of this process is the technical office, in charge of designing focused, innovative solutions. Today, the plants created by Gasparini S.p.A. are used by more than 1,500 companies throughout the world, belonging to a variety of sectors and with a multitude of needs and critical issues. Furthermore, the company – with its 110 employees – displays a strong leaning towards exports, with 90% of its turnover produced abroad (50% of this outside Europe), in stark contrast with the situation just five years ago, when half the company's turnover came from within Italy.

Gasparini is an active player on the foreign scene, taking part in 18 trade fairs and operating a sales/production branch in Brazil as well as sales offices in China, France and the USA. Together with its partners, it's a continually growing business that is looking optimistically to the future, focusing on innovation to be one step ahead of its customers wishes.



# Hardened Sercos links at the speed of light

Sercos is a highly reliable, proven and efficient automation bus which can be based on both electrical and fibre optic links. Fibre optic links are not susceptible to EMI and hence are preferably used in environments where signal integrity could be compromised.

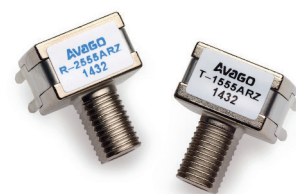


Image 1: New Avago Sercos Tx/Rx fibre optic components

Besides the EMI immunity, mechanical robustness is another important quality of the fibre optic link, being able to withstand mechanical stress and operational demands in manufacturing and end applications.

Avago Technologies, a Broadcom Limited company, has been supplying Sercos® fibre optic components to industrial markets for more than ten years. The company recently introduced a new set of Sercos transmitter and receiver components, the Avago AFBR-1555ARZ Tx and AFBR-2555ARZ Rx, featuring improved EMI performance,

enhanced mechanical stability, and low power consumption (see image 1).

## IC upgrade – improved EMI performance

The new fully-symmetrical IC with an integrated photodiode is inherently immune to electromagnetic disturbances from external devices such as neighboring switchgears. With an average optical input power sensitivity of -23 dBm, the new receiver component shows significantly improved signal integrity vs. a legacy receiver component (see image 2).

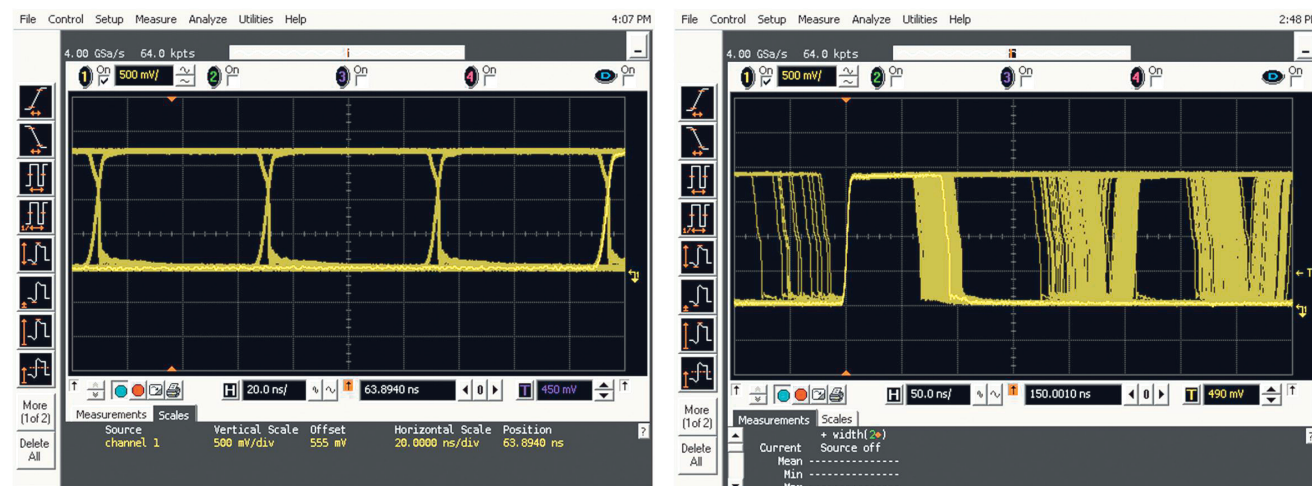


Image 2: Left: New AFBR-2555ARZ Rx component with heavy pulse modulated RF applied while receiving 16 Mbit/s PRBS7 data. Right: Legacy Rx component under the same conditions.

## LED upgrade – reduced power dissipation

The new transmitter component uses a 650 nm LED with improved efficiency. A typical optical output power of -1 dBm is achieved using only 30 mA DC, whereas older products would require 60 mA DC for similar optical power. As a result, power dissipation is reduced and product lifetime is improved.

## Housing upgrade – enhanced mechanical stability

The AFBR-1555ARZ Tx and AFBR-2555ARZ Rx are housed in solid dual-in-line metal packages. For reinforcement, an approx. 0.3 mm thick and 3 mm wide stainless steel brace was introduced, which has a surface treatment for easy wave soldering to the PCB, see image 3.



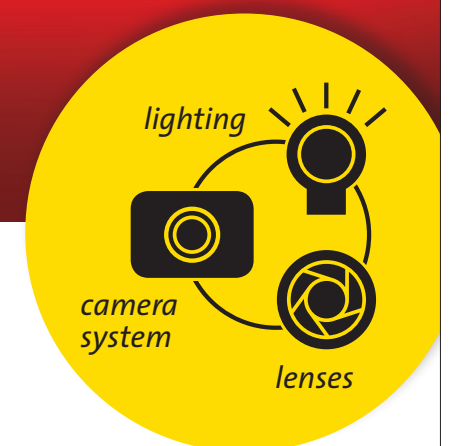
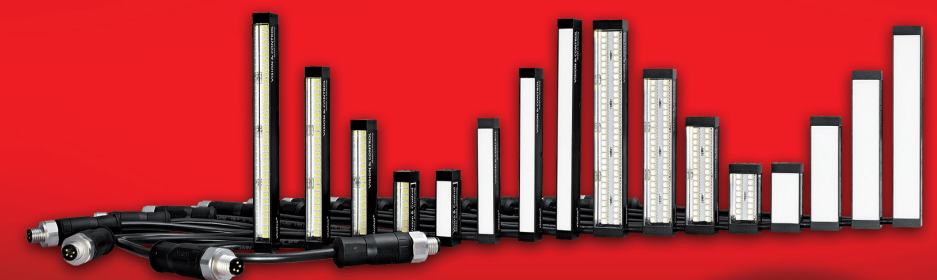
Image 3: New metal housing with solid steel brace

The steel brace significantly enhances the mechanical stability withstanding stress and operational demands in manufacturing and end applications. The superior mechanical features of the new components have been proven through various mechanical lab tests. See image 4 for an example of horizontal torque test.



Image 4: Example of horizontal torque test

# The easy way of Machine Vision



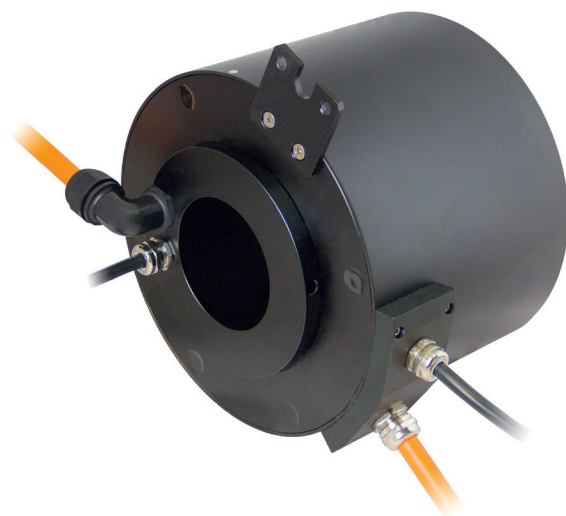
A perfectly matched system of machine vision components.

A technology that is innovative, uncomplicated and intuitive. A service philosophy with integrated specialist expertise that leaves no question unanswered. Take the easy way of machine vision. With Vision & Control.

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# Rotating Sercos

Transmitting high frequency Ethernet through slip rings



SVTS C: Sercos III hybrid cable with 100 mm through bore and special mechanical interface

The demands for increasing performance and cost reduction in motion control have led the market to the use of Ethernet-based field buses such as Sercos® III. They are becoming the new standard, overtaking the previous solutions by providing better performance and reduced time to market in the development of new machines.

An additional improvement to simplify the deployment of motion systems has been introduced by different manufacturers hybrid cables that can transport power, signals, and Ethernet-based communication with only one cable and connector in a daisy-chain topology.

It's clear that this trend and the use of rotating machines to reduce the machine footprint lead to a whole new challenge to slip ring manufacturers such as Servotecnica to reduce, as much as possible, the impact of an electrical rotary joint over the Ethernet network, because TIA/ANSI/ EIA specifications were intended for cables only.

Also hybrid cables have lower margins (attenuation, NEXT, ACR, RL, IL, etc.) than a standard, plain CAT5e cable, so the introduction of a slip ring can easily be critical to a machine manufacturer, as they can be a bottleneck through which pass all the electrical connections for a rotating part.

There were four major points to overcome in the latest slip ring design:

- Keep a clean contact over the entire rotation (also in case of standard vibrations)
- Reduce the noise generated by power lines present in the same cable as much as possible
- Reduce the crosstalk generated by Ethernet itself over the different pairs (this problem becomes bigger the larger the ring used)
- Maintain the same transmission quality over the lifetime of the product



SVTS D: Double Sercos III hybrid cable with special mechanical interface

Thanks to the use of a gold-gold technology for brushes and rings, we can have a clean and uniform contact over the entire rotation. Also, the fiber-brushes provide the correct pressure, reducing wear for a long life.

Servotecnica developed standard internal slip ring structures depending on the size and performance required to provide reliability over time of the transmission and in the presence of power lines generating noise. We ran extensive tests simulating a complete network and monitoring the behavior over time, also introducing unwanted circumstances, in order to verify the reliability of the electrical rotary joint through a stress simulation.

The result of the experiences of our customers in the field led us to develop complete documentation and standard quality controls that can provide CAT5e conformance of our slip rings with hybrid cables. All our Ethernet-based slip rings are 100% tested and certified CAT5e. Recently, we introduced standard 100 Base-T and 1000 Base-T slip ring

models, available in different configurations with additional power channels for customers who need a fast solution from stock.

Servotecnica can help you to find the best solution for your needs. For both standard and custom solutions, we will help you to reach your performance and delivery time targets.





### Conductix-Wampfler srl

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## Conductix-Wampfler FORJ type CF02

The Conductix-Wampfler FORJ type CF02 provides true dual-channel data transmission over rotating joints in all industrial automation applications, including machine tools, automated packaging, rotary stages, wind turbines, offshore rigs, materials handling, etc.

Its rugged construction from stainless steel, with F-SMA connectors and a polyurethane (PUR) protective sheath makes it ideal for extreme environmental conditions. Excellent optical performance for blue (470 nm), green (525 nm), and red (650/660 nm) wavelengths with low channel crosstalk and high channel isolation. Pre-installed optical cable with connectors.

- Full duplex data transmission
- Dual channel, high reliability
- Maintenance free
- No wear debris generation
- No lubrication required
- Wide operating temperature
- Lower life cycle cost
- Consistent performance over lifetime
- High speed capability – up to 300 rpm
- High quality/low loss POF fiber



### GSK CNC Equipment Co., Ltd.

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## GSK25i CNC Controller

The GSK25i CNC Controller with SOC hardware architecture can be adapted to many kinds of Industrial Ethernet bus technologies, including network communication based on Sercos® III. It is suitable for the control of machining centers, boring machines, milling machines, drilling machines, lathes, grinding machines, compound machine tools, and automation equipment.

### Main functions and characteristics

- Includes functions necessary for five-axis control: Five-axis RTCP function, inclined plane (3 + 2) processing, five-axis hand pulse insertion, and five-axis filtering and smoothing algorithm.
- High speed and high precision machining functions: Predictive speed smoothing processing for small line segments.

- Open soft PLC functions with external remote I/O units. The maximum I/O expansion is 1024 inputs/1024 outputs, and the maximum PLC processing capacity is 12,000 steps.
- Numerous system functions: Synchronized control of shaft feeding, automatic workpiece and tool measurement, program scheduling, tool life management, teaching programming, PLC axis control function, normal direction control, grinding fixed cycles, etc.
- Closed loop control functions: Can adapt to various raster devices to implement a closed-loop control system.
- PC networking monitoring functions with servo debugging tools.



### IMAGO Technologies GmbH

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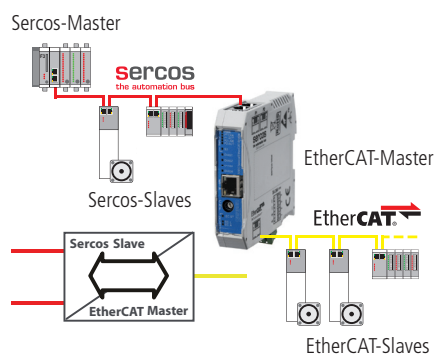
## Sercos-based VisionBoxes

IMAGO Technologies develops VisionBoxes as interface between industrial cameras and machine control since 1999.

Besides the image processing the seamless hardware integration is a key aspect: Integrated Sercos® interface and LED-controllers together with real-time Trigger-over-Ethernet reduce the complexity of cabling. As the VisionBox controls the machine vision process in real-time, the PLC is relieved and the complexity of the machine is reasonably

distributed. The compact, fanless housing fits into almost every electronics cabinet or directly in the machine.

Machine Vision without programming by using configurable SW-tools is possible as well as individual programming – or a combination of both: the VisionBox is ideal for machine vision application experts who wish to respond quickly and flexibly to the requirements of their series machines.

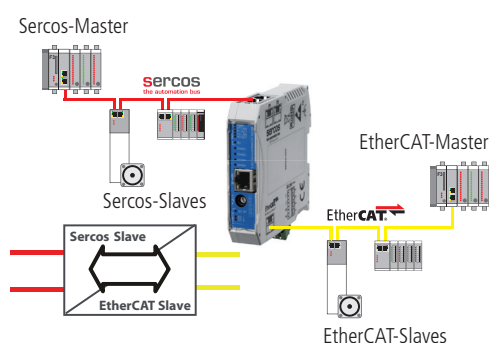


**S3ECm - Sercos-Slave & EtherCAT-Master** for direct communication of a Sercos-Master with EtherCAT-Slaves



## S3EC Sercos® EtherCAT® Bridge

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**S3EC - Sercos-Slave & EtherCAT-Slave** for cycle-synchronous coupling of a Sercos-Master with an EtherCAT-Master

## sercos the automation bus EtherCAT

- Coupling of Sercos- and EtherCAT real-time Ethernet networks
- Adjustable length of real-time data: 32 - 1024 Byte

## Automata GmbH & Co. KG

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## Panel-PC S3

The Panel-PC S3 is a modular, scalable industrial computer with touch display.

It is supplied in a stainless steel housing, with foiled aluminum front panel and resistive touch sensor. A Celeron dual-core processor is used, with 1.6 GHz clock frequency from the Intel Haswell family. Alternative available are Intel Core-i3/i5/i7 with clock frequencies of up to 1.7 GHz.

The sophisticated cooling conception allows exclusive pas-

sive cooling of all components, over a wide working temperature range.

The Panel-PC S3 allows to realize a redundant Sercos® Master Controller without using specific interface modules. This becomes possible by the combination of two Intel Gigabit Ethernet controllers i210, and the Open Source Project Sercos SoftMaster. So, you can reach cycle times of 125 µs on the bus. Both Sercos interfaces can, at choice, be used as two separate Sercos lines, or as redundant ring structure.



### Stäublitec-Systems GmbH Robotics

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☎: +49 (0)921 883-0 | [www.staubli.com](http://www.staubli.com)



## uniVAL drive "Ready to plug" robot solution for generic multi-axis controllers

uniVAL drive is a "ready to plug" solution to drive Stäubli's entire range of four- and six-axis robots with generic industrial multi-axis controllers. uniVAL drive eases the integration of Stäubli robots and makes the procedure simpler and faster than ever before – saving time, costs and resources. uniVAL drive offers benefits in terms of:

### Performance

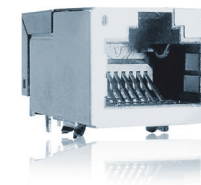
- Arm behavior benefits from Stäubli's know-how and arm behavior algorithms
- Supports major real-time field buses (e.g. Sercos, etc.) Full system access from the master controller (robot I/O, drive internal status, robot control information)

### Simplicity

- Simple integration based on standardized protocols using drive profiles (e.g. Sercos drive profile)
- The entire machine (servo axis, robot, HMI, I/O, etc.) is driven by one single control platform
- Programming is done with the well-known language of the master industrial multi-axis controller

### Safety

- Joint couplings, safety controls and robot calibration are handled by the uniVAL drive
- Servoing and robot behaviour are mainly managed by the uniVAL drive using proven servo control algorithms
- uniVAL drive implements safety functions CAT3/PlD as defined by ISO 13849



### Yamaichi Electronics Deutschland GmbH

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## New series Y-Con RJ45 Jack-7x with magnetics, light pipes and tab up

A new reflow-capable RJ45 jack is available in the industrial Y-Con® RJ45 series. The socket for 100 Mbit/s basically consists of a base body with 90° orientation of the connector to the solder pins, along with the "Tab-up" tab orientation. The individual types vary in features to ensure that the right product can be selected to meet customer needs. The complete Y-Con® RJ45 series is also used in Sercos® fieldbus systems.

The jack optionally has machine-wound transformers, additional integrated power contacts, and reflow-capable light pipes. For the power contacts and reflow-capable light pipes, Yamaichi Electronics relies on a mature design that provides customers the greatest possible flexibility in the transmission of power up to 100 W as well as in the transmission of optical signals.

With the two additional power contacts, up to 2.1 A can be transmitted at 70°C without affecting signal transmission. This is significantly more than provided by PoE. It also saves another cable.

When using light pipes, on the other hand, optical signals can be transmitted from the PCB on the front of the jack just as with an optical fibre. In contrast with the LEDs, however, light pipes have a nearly unlimited lifetime and a cost advantage. The use of light pipes in reflow soldering is also not lim-

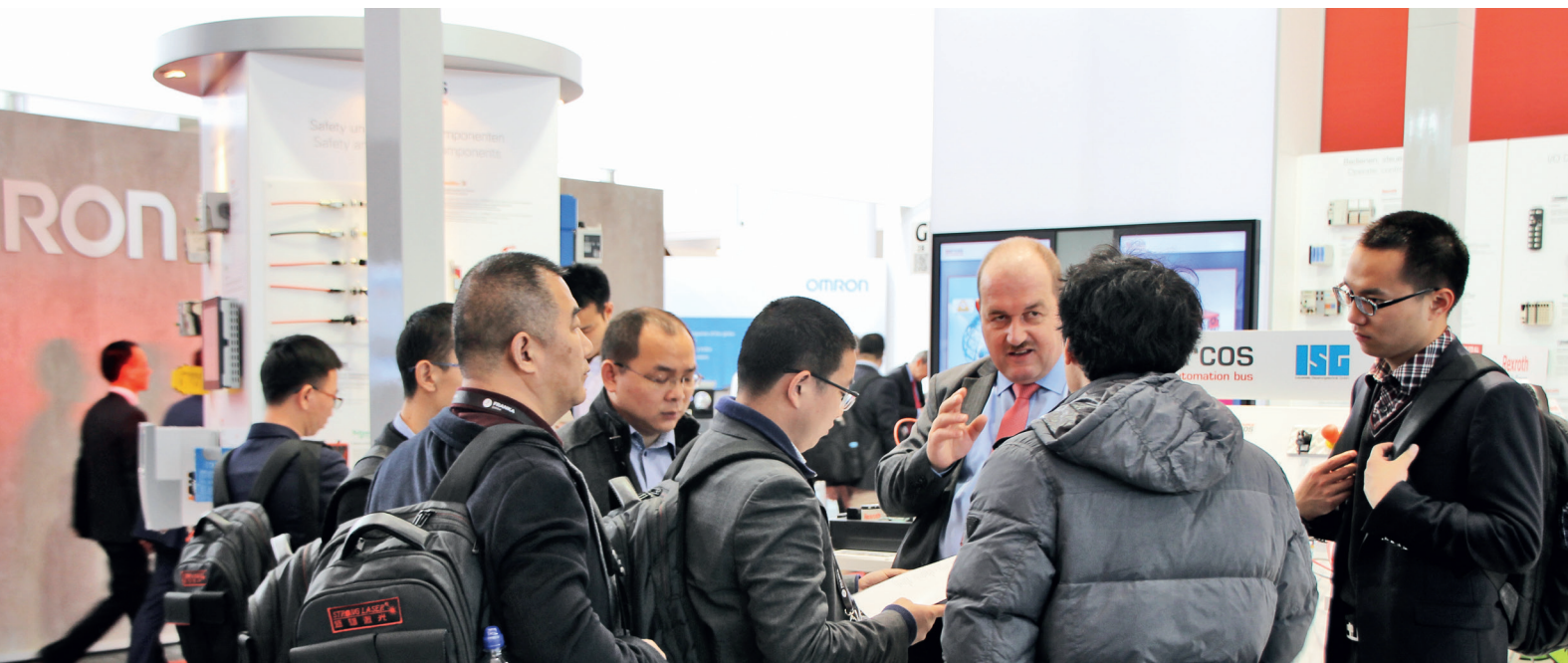
ited by the high solder temperature, and there is still complete freedom in the selection of light color.

The integrated machine-wound transformers ensure optimum, consistently good signal transmission, for example if there is no space on the PCB for magnetics when using Ethernet. In contrast with hand-wound transformers, in which performance can depend on the capability of the maker, machine-wound transformers ensure consistent transmission quality. They are also insensitive to vibrations, since the coil bodies are always cast. The series can therefore meet the strictest of requirements in the industrial sector.

### Product features

- 100 Mbit/s / CAT5
- 90° tab-up
- THT-reflow (260°C for 10 s)
- Optional power contacts
- Power transmission through power contacts: 2.1 A @ 70°
- Optional light pipes
- Optional magnetics
- Contact area: 30 µ" Au
- 1,500 mating cycles
- Compatible with any RJ45 plugs





## Sercos in Europe

Sercos International held its first Italian Sercos Conference in Bergamo, Italy in cooperation with Bosch Rexroth, Hilscher, HMS, and Schneider Electric. There were 65 participants, including users and providers from the machine and plant engineering sector, as well as equipment and automation manufacturers. The attendees were particularly enthused by the level of detail and by the opportunities given for personal exchange and networking. An accompanying exhibition rounded off the services offered to visitors. Automata, Bosch Rexroth, Conductix-Wampfler, Hilscher, HMS, Laumas, Schneider Electric, Servotecnica, and Smitec used this opportunity to present their Sercos-related products and solutions.

During SPS IPC Drives Italia, Sercos International recorded nearly twice as many contacts compared to last year. Live demos such as the Sercos® SoftMaster demo, new products and innovative technologies attracted visitors to the Sercos booth.

A highlight was the Tic-Tac-Toe demo from Schneider Electric Automation. Visitors could test their abilities against the robotic solution via a Magelis handheld touch panel that served as the operational interface.

Germany was, of course, also a focus for Sercos International with its participation at Hanover Fair and two PlugFests. Despite the visit of US president Barack Obama and the subsequent closure of hall 9 on the first exhibition day until late noon, Sercos recorded 50% more visitors by that afternoon – also thanks to the SoftMaster demo and additional highlights.

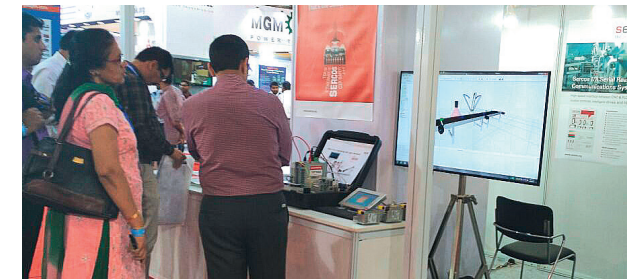
The PlugFests took place in May and October. During the two-day events, master-slave combinations were tested according to predefined test lists. Interoperability tests with extensive multidevice test set-ups were also performed.



## Sercos in Asia

In July and August, the Industrial Open Network Roadshows took place in Tokyo and Nagoya, Japan. Both events were accompanied by Sercos® seminars which contributed to their success.

Another success was the Automation Fair in Mumbai, India. There, as well as in Japan, the Sercos SoftMaster demo and the OPC UA demo attracted numerous visitors to the booth. In addition, Sercos International participated in the first IoT conference, which was part of the Automation show.



## Sercos in the USA

Sercos® participated in the Industrial Automation North America (IANA) in September, which was colocated with IMTS in Chicago, exhibiting two multivendor demos, each with more than 20 interoperable Sercos III devices from ten or more suppliers. These live demos showed the features of the Sercos automation bus and the diversity of Sercos products and suppliers available.

The demos showed how Ethernet devices from multiple vendors can be connected with a Sercos network without any additional hardware. They also demonstrated that Sercos real-time communication remains unaffected in case of a cable break or device error as well as how easy the bus and system diagnosis can be carried out.

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