Electric Drives and Controls | Hydraulics | Linear Motion and Assembly Technologies | Pneumatics | Service

Rexroth
Bosch Group

SERCOS III
Real-time communication with Ethernet

Consistent, fast and open

SERCOS III – universal communication for all applications

The vision of a real-time, non-proprietary communication solution permeates the world of industrial automation. Many of today's control systems, PLCs, motion control solutions, drives, I/O modules and safety functions have to be network-enabled. SERCOS III, the open, IEC-compliant universal bus for Ethernet-based real-time communication, already delivers the functionality you need. When you choose SERCOS III-based systems from Rexroth, you are stepping into the world of open solutions, and you are making an excellent investment for the future.

SERCOS III is the third-generation, non-proprietary SERCOS bus system which offers you a number of advantages:

- universal bus for the entire spectrum of industrial automation applications
- standardized solution defined in IEC 61158, 61784 and 61800-7
- worldwide connectivity, from the office to the field level
- flexible, cost-effective industrial Ethernet technology
- compatibility with the first international standard SERCOS 2 for real-time device profiles
- proven, benchmark-setting real-time communication mechanisms
- ease of use extends from upfront engineering right through to ongoing maintenance

What's new?

- industrial Ethernet is used as the physical layer and protocol
- higher bandwidth and shorter cycle time for even better precision
- more powerful motion control functions
- new functions for I/O modules, safety and cross-network communication
- standard IP communication included
- hardware redundancy increases machine availability and enhances noise immunity
- hot plugging – devices can be inserted and removed during ongoing operation

What has been retained?

- existing drivers and application code can simply be transferred to SERCOS III
- proven features such as topology, profiles, message structures and synchronization have been retained

An impressive list of advantages

Versatile
- consistent peripheral, drive and safety communication including standard IP communication on a single universal bus
- improved IT integration using a consistent medium – connectivity from the office to the field level

Open
- genuine Ethernet communication using any IP protocol
- compatible with existing SERCOS 2 applications, e.g. drivers, applications and hardware

Compliance with standards
- standardized communication in compliance with IEC 61158 and 61784
- enhancement to the first inter national standard for non-proprietary device profiles in digital real-time communication
- device profile complying with IEC 61800-7

Powerful
- recognized protocol for real-time requirements – plus Fast Ethernet
- benchmark-setting solution for motion control applications
- direct communication between peripherals and controllers

Cost-effective
- uses standard Ethernet networking components
- no need for switches or hubs

Flexible
- user-defined device configurations without functional limitations
- drive solutions with centralized and decentralized real-time signal processing
- hot-plugging

Safe
- CIP Safety on SERCOS supports IEC 61508-compliant safety functions up to SIL 3
- hardware synchronization ensures minimal jitter and reliable timing
- redundant cabling reduces susceptibility to cable faults

Easy
- easy configuration, start-up, diagnostics and maintenance
- fault-tolerant cabling
- pinpoint accuracy of failure diagnostics based on unambiguous protocol structure

Future-proof
- open, international standard
- non-proprietary technology and organization
- backwards compatibility provides good investment protection
- ongoing development

Proven
- products from leading drive and control manufacturers support SERCOS
- in excess of 2 million SERCOS 2 nodes worldwide in more than 350,000 applications

Ethernet – the future of industrial automation

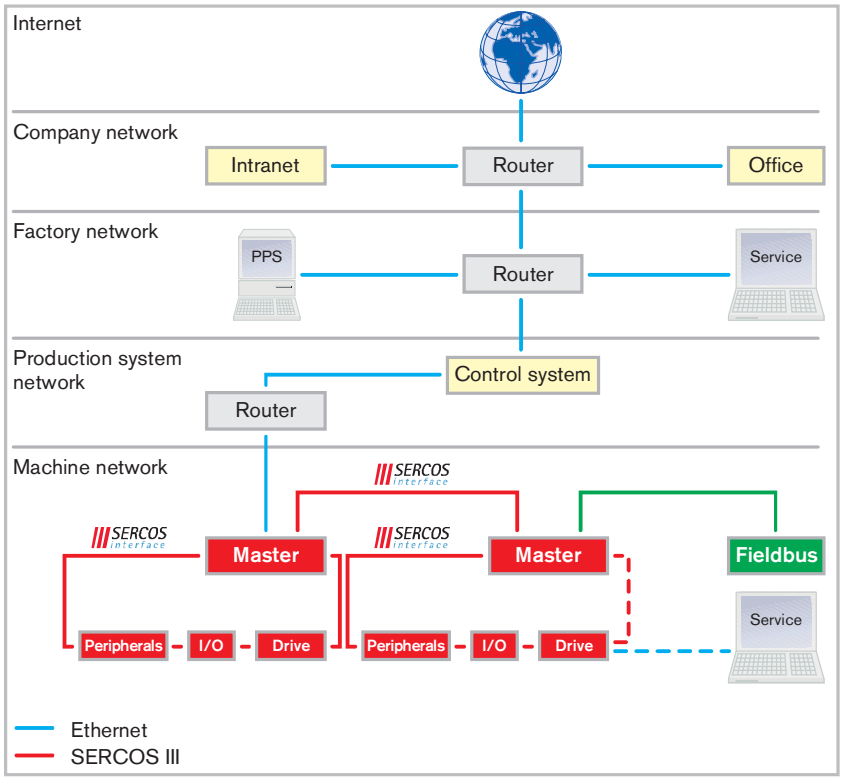
The increasing number of control components, actuators and sensors in industrial automation adds to the complexity of control networks. The future of industrial communication lies in cost-effective integration of these automation components in low-cost Ethernet networks, which have been engineered to suit the needs of industrial automation.

Ethernet – consistent connectivity from the office to the field level

Specialized fieldbus systems were used initially to simply networking. Fast Ethernet technology replaces these systems and offers a number of advantages:

- recognized, future-proof technology
- data throughput 10 to 100 times faster than fieldbus solutions
- no need for expensive, proprietary technology
- standard components, e.g. CAT5e copper cable with double shielding; connectors and controllers produced in large volumes, e.g. FPGAs
- consistent IT implementations stretching from the office to the field level
- flexible, compatible automation systems based on a global standard
- supports worldwide networking for diagnostics and maintenance

Ethernet technology combines the peripherals, drives, safety functionality and office communications in a common medium providing a simple, cost-effective, powerful solution.



Universal but still unique

SERCOS is based on the first international standard for digital real-time communication in drive applications.
It uses a standardized protocol and standardized communication and device profiles. SERCOS III devices are fully compatible with each other without the need for special drivers or configuration files.

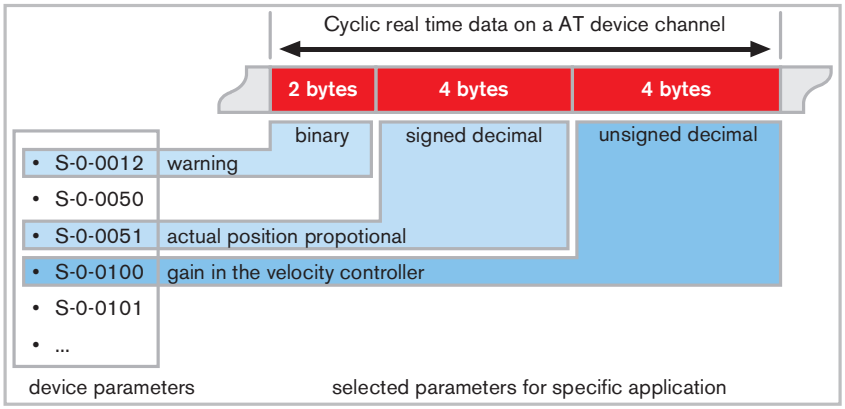
SERCOS III communication is based on standardized parameter sets to control device functions. There are no hardware or manufacturer dependencies. When the network is initialized, the parameters which make up the real-time data set on the device channel are defined in the configuration.

SERCOS III is a universal bus which offers communication channels and device profiles for all standard automation applications:

Real-time communication channel
- M/S (master/slave)
  exchange of functional data between master and slave in an M/S data channel
- CC (cross communication)
  direct peer-to-peer communication between devices on a CC device channel, either between controllers (C2C) or between drives and peripheral slaves (CC)
- SVC (service-channel)
  service data exchange on an SVC channel
- SERCOS safety
  exchange of safety-related data on an M/S or CC device channel, e.g. shut down or enable signals

NRT communication channel
- standard Ethernet
  connectivity to any non-real-time Ethernet device such as a notebook PC or I/O device
- other Ethernet protocols
  routing of special Ethernet protocols on a NRT channel, e.g. third-party real-time protocols

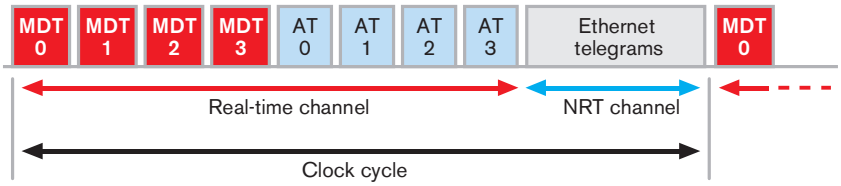
Device profiles
- motion profile
  motion and PLC functions for controllers based on SERCOS motion control parameters with additional enhancements and better performance
- Drive profile
  drive control functions
- I/O profile
  functions to control I/O devices



SERCOS III-real-time communication with standardized parameters

The SERCOS III protocol – the DNA for your industrial communications

SERCOS III uses a powerful protocol to meet the needs of today's industrial automation solutions. It combines the advantages of non-proprietary standard Ethernet with the real-time-precision of industrial automation technology.



Open SERCOS III communication cycle

SERCOS III uses IEEE 802.3 compliant Ethertype 0x88CD to send data in cyclic messages (telegrams), which provide M/S, SVC, CC and Safety communication channels and fully meet industrial real-time requirements.
The data consists of standardized motion, drive and I/O profile parameters.

The telegram types are listed below:

Master Data Telegram (MDT)
The master sends command data to the slaves.

Answer Telegram (AT)
The slaves send status data back to the master.

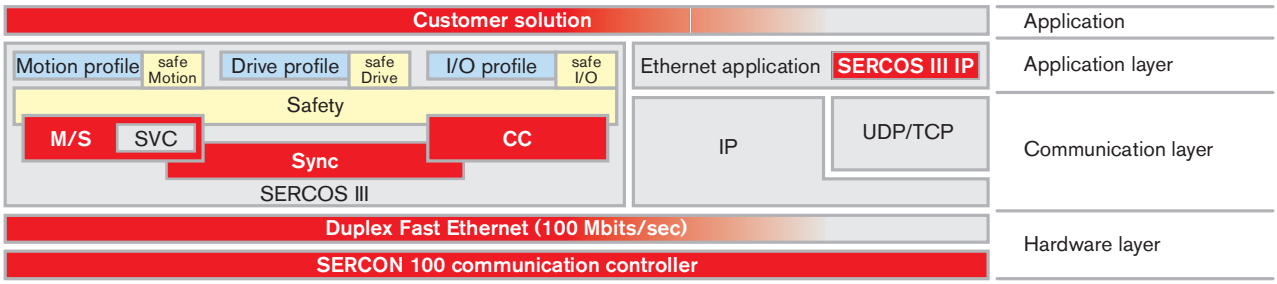
The attached devices are identified, addressed and configured during the initialization phase. Device channels are allocated to each slave in the MDT and AT. The slaves read data from and write data to the channels . Up to 4 MDTs and ATs are sent from the master per clock cycle depending on the data volume. Telegrams transport data from device to device.

The relevant command data is read or the requested status data is written in each of the devices. Conventional IP communication, for example e-mail, web services or proprietary protocols from third parties, are handled in a channel outside of the SERCOS III telegrams.

This un-encrypted NRT channel, which sits directly on top of the Ethernet layer, has a number of advantages:

- slave test and configuration without initialized real-time Ethernet and master hardware
- standard Ethernet devices such as laptops can be connected directly to SERCOS III devices
- full computational performance for the application, because the master does not have to encrypt or fragment the IP packages

SERCOS III – highly flexible and open for all types of communications



SERCOS III has a robust, clearly-defined data structure which enhances operational reliability and simplifies application development. The status of the entire network is always transparent and unambiguous. This creates the ideal conditions for simple system diagnostics at every node using standard Ethernet diagnostic tools.

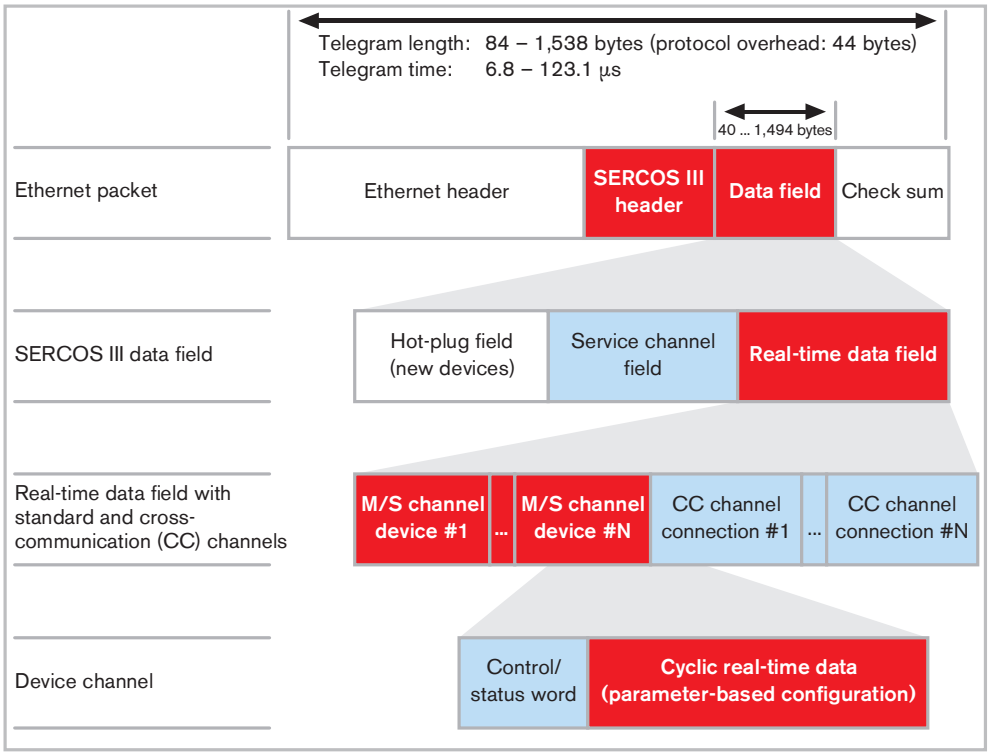
SERCOS III telegrams contain a SERCOS III header and a data field which are embedded in the Ethernet frame. The SERCOS III header describes the current network phase and the position of the MDT (Master Data Telegram) and AT (Answer Telegram) in the clock cycle.

The MDT and AT data fields are subdivided into three sub-fields:

Hot-Plug Field
Information on slaves which are plugged in during an ongoing operation and which will have to be plugged in again

Service Channel Field
Device channels for slave configuration

Real-Time Data Field
Device channels used by the slaves to transmit real-time data



SERCOS III telegrams – clearly-defined data structure enhances operational reliability and simplifies development

The SERCOS III network – trust in a well-practiced team

SERCOS III networks have at least one master to maintain control and one slave to execute the automation functions. The devices are configured in a simple, clearly laid out line or ring topology.

Every SERCOS III device has 2 Ethernet ports which are connected to the previous and next devices via a CAT5e Ethernet cable. The SERCOS III line or ring topology eliminates the need for expensive network technology such as switches.

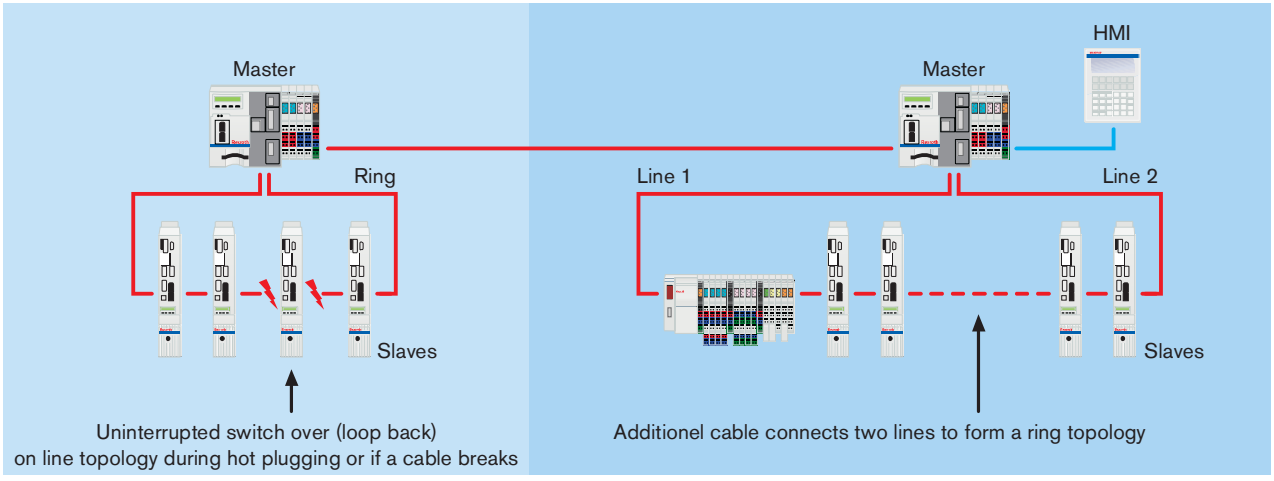
Line topology
All of the SERCOS III devices are connected in series. The master is located at the start of a line or between two lines. The data passes through the slaves and is looped back by the last device. All of the users analyze the data that is passing in both directions, and this guarantees that all data reaches each user during one cycle.

The advantage
Simple, low-cost device networking over long distances, e.g. assembly or processing lines.

Ring topology
One additional cable can be used to form a SERCOS III ring network. The master sends data to the ring in opposite directions from the two ports. The data which is traveling in each direction can be analyzed.

The advantage
The ring topology offers the added advantage of redundant cabling which improves fault tolerance.

Whether you choose line or ring topology, your SERCOS III network will be simple and clearly laid out.

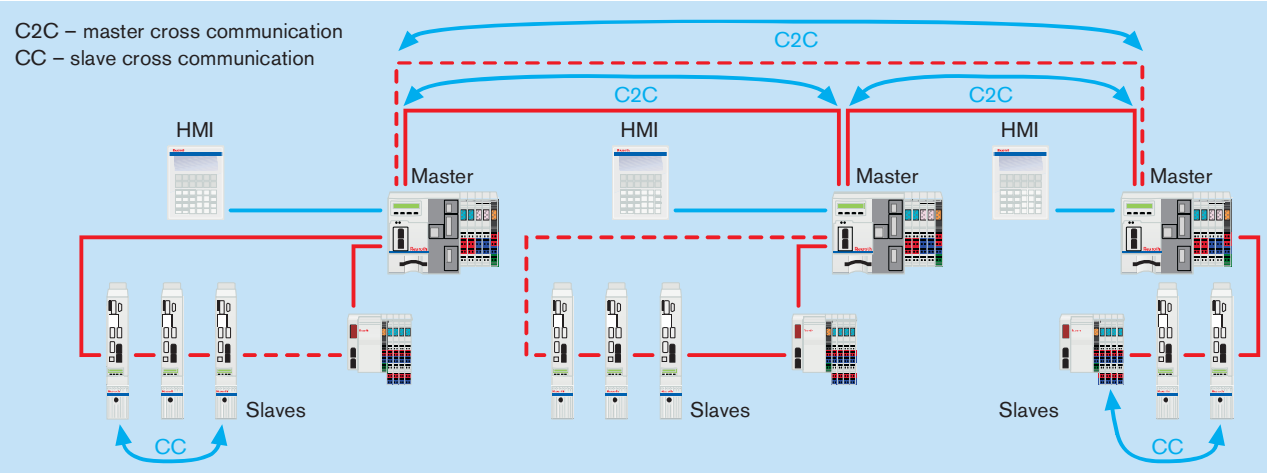


Maximum availability
A network with a fail-safe ring topology remains available without interruption during hot-plugging or in the event of a cable break. The additional cable in a ring network maintains the link to the master even if a cable breaks. The high-performance slave controllers switch over without delay to two separate lines with loop back at the point where the break occurs. The break can be pinpointed, and the defective cable can be easily replaced during ongoing operation. Redundancy also makes it possible to plug devices in or out for maintenance or to add additional devices. The system automatically continues to operate seamlessly using the new configuration.

Short distances
Direct communication across all device levels including cross communications between drives or controllers makes SERCOS III the ideal choice for distributed intelligence and full real-time performance. Indirect communication between slaves which is routed through the master would pose a risk for synchronous motion, for example on gantry axes. Using CC cross-communication, SERCOS III slaves can communicate with each other directly with no delay, providing the basis for unrestricted real-time communications and intelligent automation configurations. The same principle applies to C2C communication between controllers.

Perfect timing
SERCOS III devices use internal clocks to synchronize signal execution all across the network. This compensates for minimal timing deviations without affecting bandwidth. Due to the physical characteristics, it takes a certain amount of time for a data message to reach a node. In contrast to conventional Ethernet bus systems, SERCOS III uses internal clocks to synchronize the exact execution time. The receipt of the first MDT in cycle is used to synchronize these clocks with the master clock. As a result, exact synchronization can be achieved without the need for timing data for distributed clocks which would degrade performance.

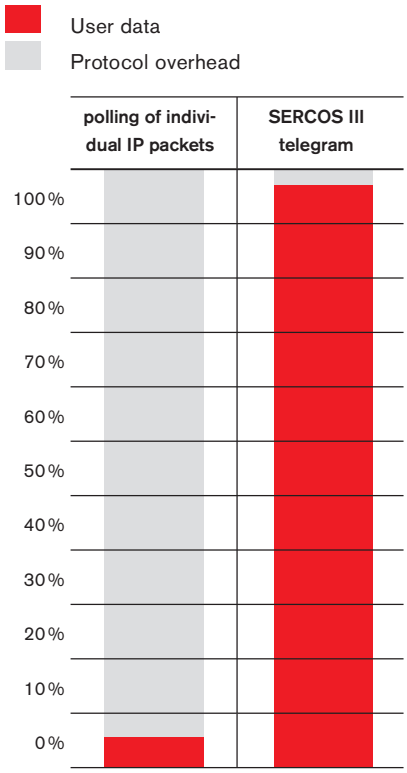
Cross communication – faster data exchange between nodes



SERCOS III – uncompromising precision and efficiency

Because it delivers excellent performance in practical application, SERCOS has become the leading drive communication technology. High data transfer rates and high-precision synchronization make SERCOS III the solution of choice for deployment of decentralized automation systems.

Optimal bandwidth utilization
With conventional office Ethernet protocols, user data which is embedded in a defined framework of protocol overhead data is sent as individual packets to each device.



SERCOS III makes maximum use of the available bandwidth

When the amount of information which has to be sent is small (for example, simple set point data), the overhead accounts for a disproportionate amount of the total data traffic.

Here is a simple example which demonstrates efficient use of Fast Ethernet bandwidth: if 4 bytes of status data were sent individually to 20 devices, 1,680 bytes would have to be transferred (the minimum Ethernet packet size is 84 bytes), but only 80 bytes would be used productively for the application. This equates to about 5 % of the bandwidth even with the shortest cycle time. Packet collision would further restrict the useable bandwidth. In SERCOS III telegrams, all of the device user data up to 1,494 bytes is bundled together plus 44 bytes of overhead data. With a maximum packet size of 1,538 bytes, the bandwidth which is available for productive data increases to as much as 97 %, and deterministic data traffic is obtained without collisions.

Keeping jitter to a minimum increases precision

Real-time precision requires accurate signal timing and simultaneous signal execution. SERCOS III cyclic communication ensures accurate signal timing, and unique hardware synchronization combined with minimal jitter ensures maximum real-time precision. The jitter on a SERCOS III master is only ± 10 ns.

Automatic telegram optimization increases efficiency

The number and length of the telegrams on the real-time channel are automatically adjusted to match the application data volume and number of nodes that are registered.

The cycle time is pre-selected for optimal bandwidth utilization, or it is automatically adjusted to match the data volume on the real-time channel. The portion of the cycle which is not used by real-time telegrams is available for standard IP communication on the non-real-time channel. Telegram size, cycle time and NRT channel bandwidth can be manipulated to make maximum use of network bandwidth.

cycle time in µs	cyclic data per device in bytes	max. devices (without NRT channel)	max. devices (with NRT channel, 250 bytes = 20 µs)	max. devices (with NRT channel, 1,500 bytes = 125 µs)
31.25	6	8	3	–
62.50	12	16	10	–
125	16	30	25	–
250	12	66	60	33
250	32	34	31	17
500	12	130	124	100
1,000	50	100	98	85
1,000	32	140	137	120
1,000	12	254	249	220
2,500	16	511	511	511

Real-time data, NRT communication and cycle time at a glance

Safety included – CIP Safety on SERCOS

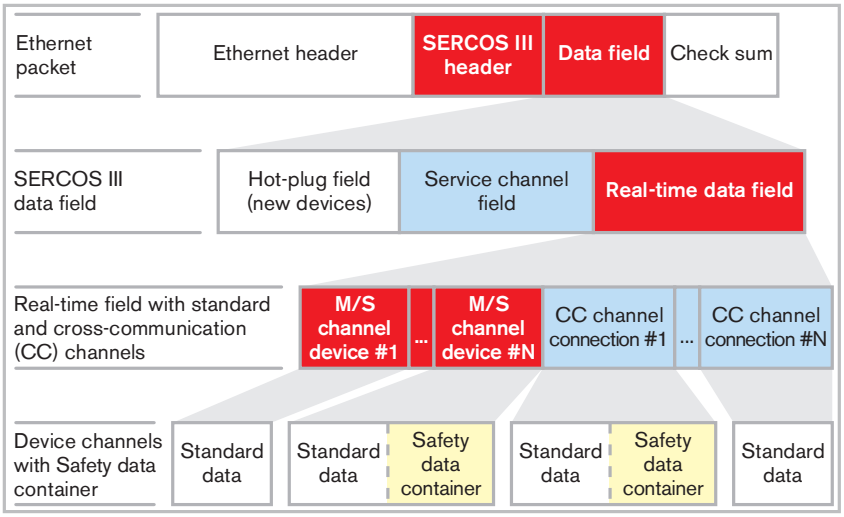
Safety included – CIP Safety on SERCOS is the protocol which is used to transfer safety-related data on SERCOS. It was defined in collaboration with ODVA and has been certified for compliance to IEC 61508 up to SIL 3. There is no need for an additional safety bus, because the safety information is sent in addition to the standard data on the SERCOS network in real time. The combination of drives, peripherals, safety bus and standard Ethernet in a single network simplifies handling and reduces hardware and installation costs, and it makes it easy to deploy integrated safety controllers and homogeneous safety solutions.

CIP Safety on SERCOS means:

- the CIP Safety standard is used as the functional safety protocol
- CIP Safety adapted to SERCOS
- SERCOS-specific safety profiles

With CIP Safety on SERCOS, the data is sent on the same medium using the same connection as standard communication. Reliable communication can take place between all network levels including peer-to-peer communication and cross-network communication. The master does not necessarily have to be a safety controller. It can also route data without being able to interpret it. Safety-related data is sent in a safety data container which is placed on the real-time data channel (MDT and AT) similar to standard data.

CIP Safety on SERCOS – integrated safety



SERCOS safety data container – for transferring all safety-related data

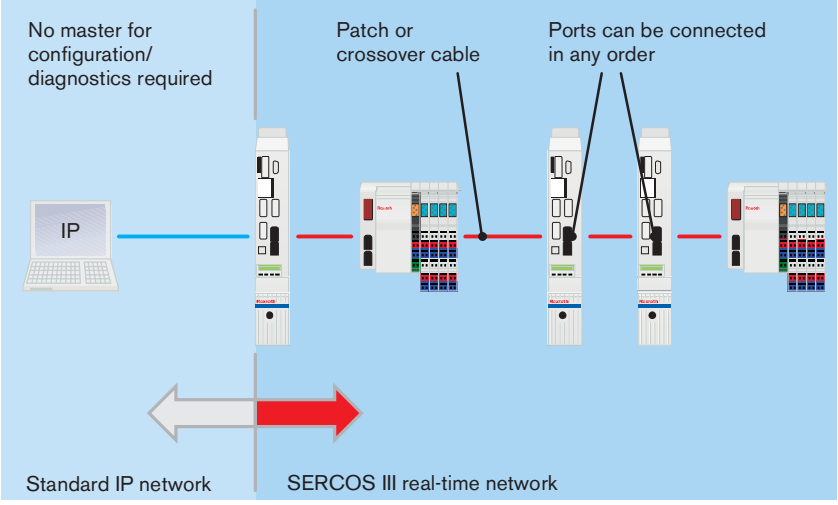
Simplifying the process – from upfront engineering to maintenance in the field

Configuration, commissioning, diagnostics and maintenance of SERCOS III networks could hardly be easier. SERCOS III is focused on the application. It organizes your network, eliminates problems and takes the pain out of troubleshooting.

All devices are connected with standard CAT5e cables. The network is synchronized and ready to go following a brief initialization phase. Devices which have been hot-plugged are automatically integrated during ongoing operation.

The benefits

- automatic device detection eliminates the need for pre-settings and address allocation during startup. Switches are available to set addresses manually if necessary.
- automatic detection and resolution of address conflicts
- foolproof cabling avoids mistakes during installation and maintenance, because both device ports have identical functions, and there is no need to distinguish between the two when cables are attached
- simple spare part management, because patch and cross-over cables are interchangeable
- service PCs can be attached to the SERCOS III network if no master hardware is present during installation
- full diagnostic capability including automatic detection, localization and circumvention of cable breaks
- standard diagnostic tools can be used to monitor the network state at any time
- hot-plugging makes it possible to repair or modify the system without affecting the rest of the network
- maintenance can be performed from anywhere in the world over the internet



Configuration and startup are simple, transparent and foolproof

Well integrated – SERCOS III systems in the Rexroth Automation House

Rexroth's Automation House offers you all of the building blocks you need for your industrial automation solutions from a single source. The range includes component-level IndraDrive and IndraControl products, motion and logic systems such as IndraMotion and IndraLogic as well as the IndraWorks engineering framework.

Automation of today's production machines continues to become more sophisticated. Customers want higher productivity, greater flexibility, simpler system integration and open architecture which facilitates expansion, and they expect that their engineering and production costs will decrease as well. You need a strong partner with a good automation track record and in-depth knowledge of your industry which can deliver complete, seamless solutions for every CNC, motion and robot control application. We continue to develop our systems to meet your specific needs.

The result is an innovative, modular system which is designed for flexible, scalable automation solutions – consistent, intelligent and future proof:

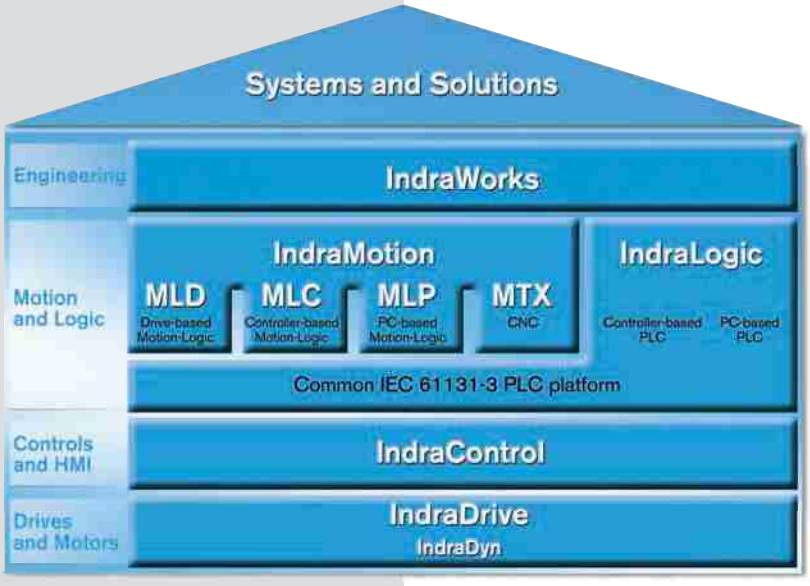
IndraWorks
The fully-featured engineering tool for project planning, programming, visualization and diagnostics

IndraMotion
Scalable system software for highly productive motion control applications

IndraLogic
The IEC-compliant PLC solution for intelligent automation

IndraControl
The scalable controller platform which increases transparency in your production operations

IndraDrive and IndraDyn
The intelligent drive solution with a large selection of motors.



Rexroth has chosen SERCOS III to provide consistent communication for all Automation House components and systems

IndraLogic –
open PLC systems
Rexroth's innovative IndraLogic runtime system sets new standards in open automation. IndraLogic is a central software platform for seamless control, communication, programming and engineering. It offers full IEC 61131-3 compatibility and gives you a world of freedom when you deploy your automation solutions.

IndraLogic L
Controller-based PLC solutions using IndraControl L hardware

IndraLogic V
PC-based PLC solutions using IndraControl V hardware

IndraMotion –
integrated motion logic systems
IndraMotion systems are based on IndraLogic and offer additional functions for a whole range of automation applications.

IndraMotion MLD
Drive-based motion logic system using IndraDrive hardware

IndraMotion MLC
Controller-based motion logic system using IndraControl L hardware

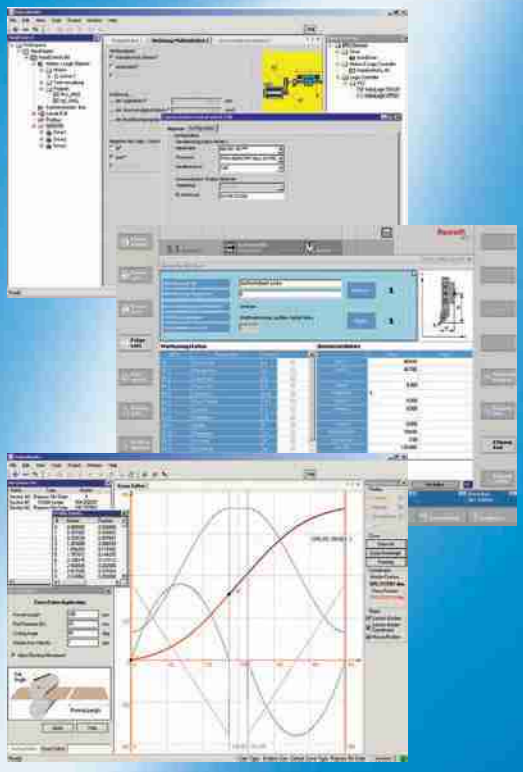
IndraMotion MLP
Embedded PC-based motion logic system using IndraControl V hardware

IndraMotion MTX
Controller and PC-based CNC systems using IndraControl L and V hardware

IndraLogic and IndraMotion are the innovative automation solutions which are part of Rexroth's advanced Automation House

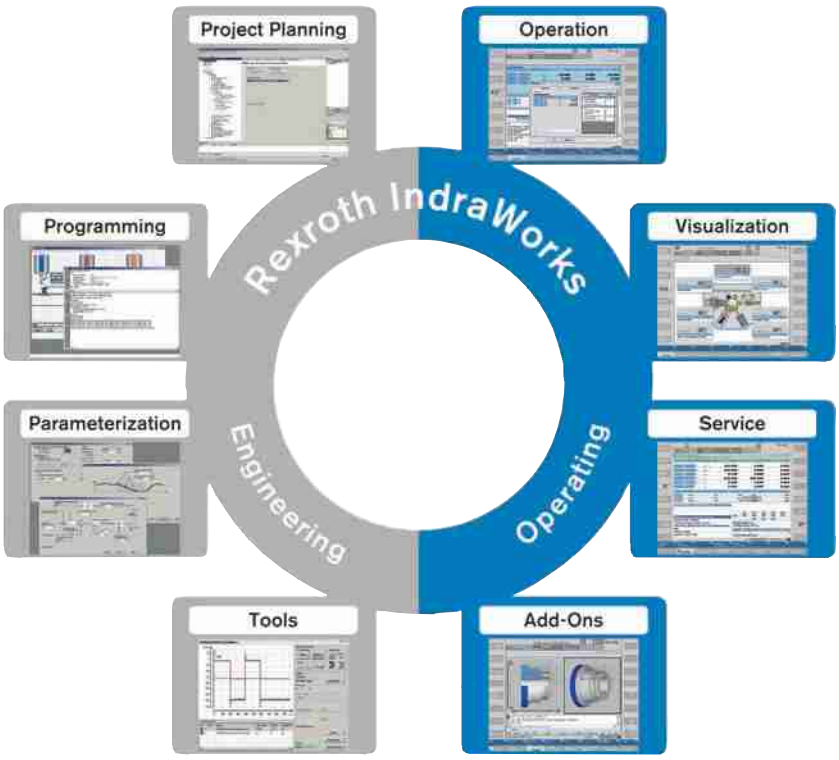
Rexroth IndraWorks enhances engineering efficiency

We are at the dawn of a new engineering era. IndraWorks provides a uniform software environment which handles the entire range of engineering tasks – from project planning and programming right through to visualization and diagnostics.



Innovation
The uniform IndraWorks engineering framework is available for all of our systems including IndraMotion, IndraLogic and IndraDrive. You benefit from faster and more user-friendly access to functions and system data for all components.

Using standardized tools and interfaces, you do all of your engineering work centrally in a single software environment which is consistent, efficient and intuitive. Rexroth is a member of the Microsoft Developers Network, providing investment security for your advanced total solutions with SERCOS III.



IndraWorks – task-oriented operation and visualization

Simple hardware implementation

SERCOS III is installed on all Rexroth control systems as the standard communication bus. Third-parties have the option of offering SERCOS III on their own systems.

SERCANS III – PC plug-in board

Always the right SERCOS III hardware for your application

The following hardware connectivity is available:

Communications Controller
A communications controller is used to provide SERCOS III connectivity

- based on an FPGA logic chip or
- as a general-purpose multi-protocol Ethernet controller

Various versions of the Xilinx "Spartan 3" and Altera "Cyclone II" FPGA chips are available for SERCOS III. The SERCOS III software core can also be added to existing FPGA solutions.

The Hilscher "netX" multi-protocol Ethernet controller supports SERCOS III master and slave connectivity.

All of the controllers are available in a number of versions which cover the performance spectrum from simple I/O controllers and drives to master controllers and control systems.

SERCANS III PC plug-in board
Fully-assembled SERCANS expansion boards can be used to connect standard PCs to a SERCOS III network. Versions are available for PC bus systems such as PCI.

Starter/evaluation kits
To make the transition to SERCOS III even easier, PCI boards for standard PCs along with master or slave software are available for training purposes. There are also WinCE drivers for X86 platforms.

FPGA solutions for Xilinx (Spartan 3) and Altera (Cyclone II) chips		Hilscher multi-protocol chip (netX)
SERCOS interface XILINX SPARTAN-3 FPGA	SERCOS interface ALTERA Cyclone II	netx networX on chip Hilscher NETX 500 A 0535LU601 ARM

Behind the scenes – SERCOS International e. V.

SERCOS III technology is open, non-proprietary and freely available. The independent SERCOS International e. V. user group has been using this approach since 1990. In addition to representing the interests of its members, the user group provides an efficient and open forum for experts, supporters and interested parties who make an active contribution. The oldest international user group for real-time communication pools the expertise of more than 60 member organizations around the world, and it has subsidiaries in North America and Japan.

www.sercos.org
www.sercos.com
www.sercos.de

SERCOS III interface

Basic principles

- SERCOS is a truly open standard – the technology and user organization are completely independent of the individual companies
- experts from member and non-member organizations can actively contribute to the development of SERCOS in the engineering working groups
- SERCOS undergoes continuing development – the developers take a broad approach and give due consideration to suggestions which arise during practical application in a wide range of industries
- SERCOS International e. V. is an officially recognized partner of IEC (SC22G, SC65C) and DKE (K226 and GK953), and it participates in the activities of a number of national and international bodies

User benefits

- devices which are based on SERCOS technology offer excellent performance. They are designed for practical application, they comply with the standards and they are future-proof
- the product range, sources, support and training are not dependent on individual manufacturers and proprietary standards
- the technology is supported by established global players including Bosch Rexroth, Rockwell Automation and Phoenix Contact

Other advantages for members

- opportunity to put own requirements and suggestions forward for consideration during the continuing development of SERCOS
- active members are always up to date with the latest developments
- common platform for marketing and PR, e.g. at trade shows

Consolidated know-how – worldwide

SERCOS North America

Aagard
Beckhoff Automation
Bosch Rexroth Group
CAMC
Card-Monroe
Cincinnati Lamb
Danaher Motion
Industrial Fiber Optics
Industrial Indexing System
Industrial Sales Management
Robotic Systems Integration
Rockwell Automation
University of Akron
Yaskawa

SERCOS Japan

Amada
Bosch Rexroth Automation
Digital Electronics
Hirata
Honda Engineering
JTEKT Corporation
Mori Seiki
Nippon Pulse Motor
Nissan Motor
Okuma
Opton
Sanyo Denki
Shiga Yamashita
Toshiba Machine
Yaskawa Electric

International experts recommend SERCOS

"Rexroth has the best drives worldwide. They are innovative and have an excellent reputation in the industry. The SERCOS interface, which is standardized worldwide, is designed to handle high-performance synchronization."
Ralf Schubert, Gerhard Schubert GmbH/Divisional Manager, Technical Engineering and Assembly

"For more than 12 years now, SERCOS has been the ideal answer to our requirements: its open architecture and independence allow us to maintain full control over our technology. The proven functions and comprehensive diagnosis capabilities are critical for our main business – reliable processing solutions featuring excellent and proven quality. SERCOS-based products help us to offer highly efficient, easy-to-handle and failure-proof production systems to our global customers."
Toshihiro Yonezu, JTEKT Corporation/Manager CNC Group

"At 3S, there was never any doubt that we would implement SERCOS III in our CoDeSys system. We have had very good experience with SERCOS II. The excellent level of drive profile standardization allows us to operate devices from a variety of manufacturers without time-consuming drive development or modification. SERCOS III already provides the basis for uncomplicated, reliable, fast, synchronous drive data transfer. We believe that it offers us and our customers very significant advantages."
Manfred Werner, 3S-Smart Software Solutions GmbH/Managing Director

"In developing SERCOS III, our member companies have driven the continuing evolution of the worldwide SERCOS standard, turning it into a powerful real-time Ethernet solution. SERCOS III offers a whole range of new and innovative functions, and it sets the standard for current and future motion control applications. SERCOS has now successfully made the transition from a drive interface to a general-purpose automation network."
Peter Lutz, SERCOS International e. V./Managing Director

"Our flexible tufting machines allow our customers to create innovative patterns and designs, improving their product quality and variation while increasing efficiency and productivity. This requires a fast deterministic machine control system that can easily be modified or updated, while shortening commissioning and startup time through portable programming. SERCOS brings both requirements together, offering the best value as a bus system for our machines."
William Christman, Card-Monroe Corp./Director of R&D

"The system design fits in very well with our philosophy, and that was the crucial factor that tipped the scales in favor of Rexroth. Even back then, Rexroth was able to offer modular system architecture, and that gave us the tools that we needed to do exactly what we had in mind, namely to deliver electronics which every customer can comfortably handle on site."
Werner Oster, KHS AG Packaging Competence Center/Manager Technical Sales/Product Support

"High productivity, reliability and good investment protection are the outstanding features of our system solutions. For us, there is no alternative to top speed, real-time communication and data transfer as well as unrestricted safety, availability and open design. SERCOS offers this unique profile combined with a proven track record in the field." **Dr. Elmar Wings, ProCom Systemhaus und Ingenieurunternehmen GmbH/Engineering Manager CNC Products**

"The importance of safe bus systems continues to increase in industrial automation. The SERCOS safety concept is an essential element of modern system design."
Klaus Kemp, TÜV Rheinland Industrie Service GmbH/Project Manager Functional Safety/Software

"SERCOS III is an open communication interface which is used in devices supplied by a range of different manufacturers. Immediate, problem-free device interoperability is only guaranteed if the manufacturers adhere strictly to the specification. On behalf of SERCOS International, we conduct conformity testing on all SERCOS devices in our test lab. Users have the confidence that certified SERCOS devices are truly compatible."
Hans-Peter Bock, ISW, University of Stuttgart/Communications Interfaces Group Leader

"Our customers require maximum availability and fully synchronous operation from our printing machines. Simple, modular design in distributed networks, safety functions and a proven track record for precision are strong arguments which clearly speak in favor of SERCOS as our bus system. Successful implementation of more than 20,000 axes in the field since 1995 confirms us in our conviction that we have made the right choice."
Andreas Birkenfeld, König & Bauer AG/Division Manager Construction System Technology

"A robust real-time communication system is absolutely essential for the excellent print quality and reliability of our machines. The communication system guarantees fully synchronous operation and maximum availability combined with unrestricted productivity. We have decided to use SERCOS which is the established standard in the real-time market."
Harald Bollhöfener, Fischer und Krecke GmbH & Co./Manager Electronic Engineering

Rexroth and the BOSCH Group – a clear commitment to SERCOS III

Reiner Leipold-Büttner,
Bosch Rexroth AG/Executive Vice President Engineering and Manufacturing

"We have made a conscious decision to use internationally standardized communication mechanisms and programming languages. That is a fundamental difference between the Rexroth automation system and other products that are based on proprietary solutions which protect the systems from competition and keep prices high. That is why we make every effort to support the development of SERCOS III, which combines two standards that are currently very important: the proven real-time mechanisms of the SERCOS interface and the Ethernet physical layer which is used throughout the world. We now have an open, high-performance communication system which is supported by a number of drive and controller manufacturers and is being developed further."

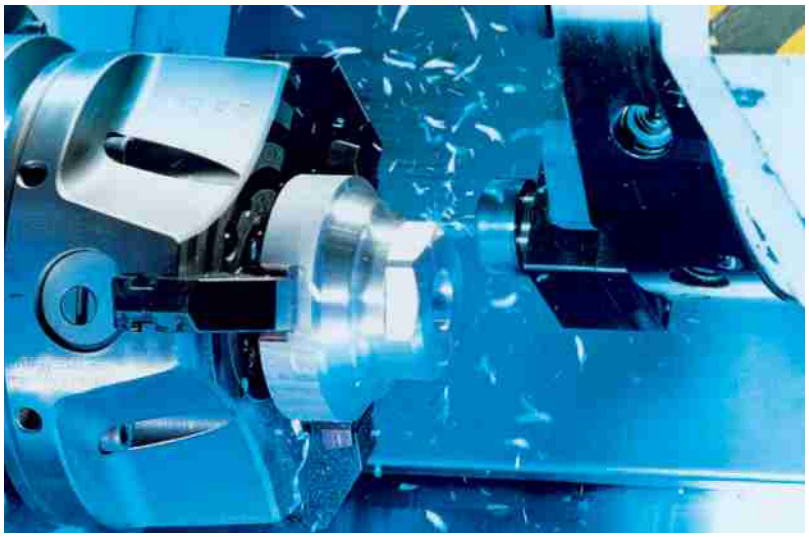
Dr. Karl Tragl,
Bosch Rexroth AG/Executive Vice President Sales

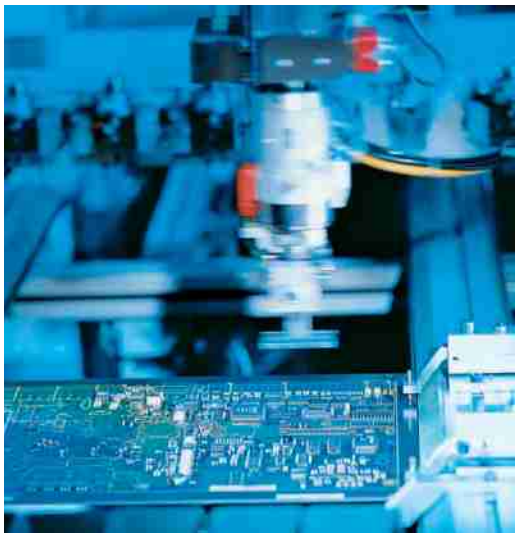
"Customers rightfully expect to get the best automation solutions from the 'Drive and Control Company'. These solutions are built around a seamless communication system which enables our customers to fully utilize the excellent quality of our products in their applications. SERCOS III is the standardized, leading real-time high-performance bus for sophisticated drive solutions, and it is also the optimal, universal communication solution. Now in its third generation, SERCOS has a proven track record that extends back over many years of practical experience as an industrial-grade bus system. SERCOS is faster, more reliable and less complicated, and it delivers higher precision. SERCOS is also more open. We simply cannot afford to become dependent on the technology and strategy of any single manufacturer. That is why we have firmly supported the SERCOS interface since day one. SERCOS is standardized from the protocol to the device data, and it is non-proprietary. The highly intelligent devices in the Rexroth product portfolio offer simple, fully compatible plug & play functionality."

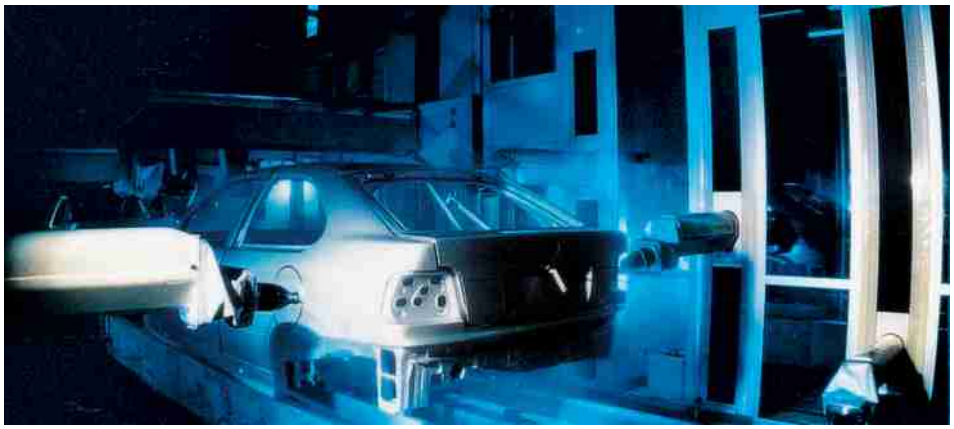
Frank Westphal,
Robert Bosch GmbH/Head of Department R&D Production Automation

"In the research and advanced development community within the Bosch Group, we are responsible for coordination of control technology in the plants. A corporate-wide strategy must be based on universal, powerful, uncomplicated and above all non-proprietary systems. Following intensive analysis and intensive practical testing, we came to the conclusion that SERCOS III offers unparalleled performance and simplicity. The unique, open, standardized communication strategy offers a significant advantage compared to other bus systems which are often dominated by individual manufacturers. That is why we promote the use of SERCOS III as the universal bus system within the Bosch Group."

SERCOS III –
the right communication system for your industry







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