

Sercos = Real-Time + IoT

The architecture of Sercos allows simultaneous use of Sercos, EtherNet/IP, TCP/IP and CIP Safety messages over a single Ethernet cable in the machine. Neither additional hardware nor optional tunneling of the protocols is required for that purpose.

The unmodified Sercos protocol operates over Ethernet TSN for real-time communication and high data volume using the same standard network at lower cost.



Demo to explore Sercos automation bus

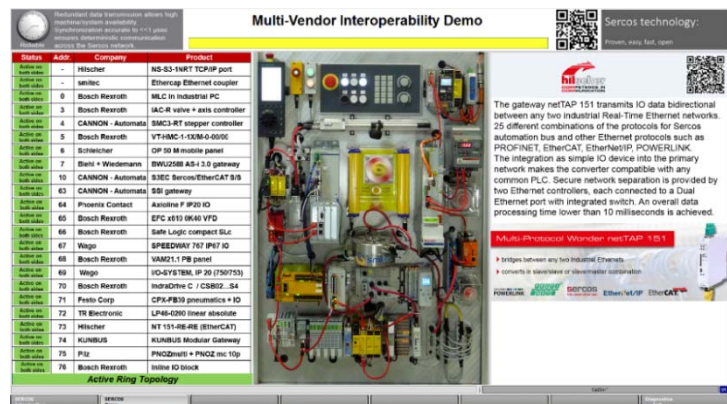
This multi-vendor demo presents several Sercos automation bus user benefits:

- Maximum Ethernet network reliability with real-time network redundancy
- Certified products from numerous vendors work together on the same Ethernet cable
- Proven high-speed Ethernet communication
- Easy to understand and use due to IEC standards
- Supports I/O, motion and other peripherals
- New possibilities with direct communication (DCC) between network devices
- Configure/troubleshoot a device at any time using Ethernet TCP/IP (UCC) communication, even if real-time Sercos communication is not operating
- Standardized parameters across different products save time in training, setup and troubleshooting

More at www.sercos.org/technology

Demo use

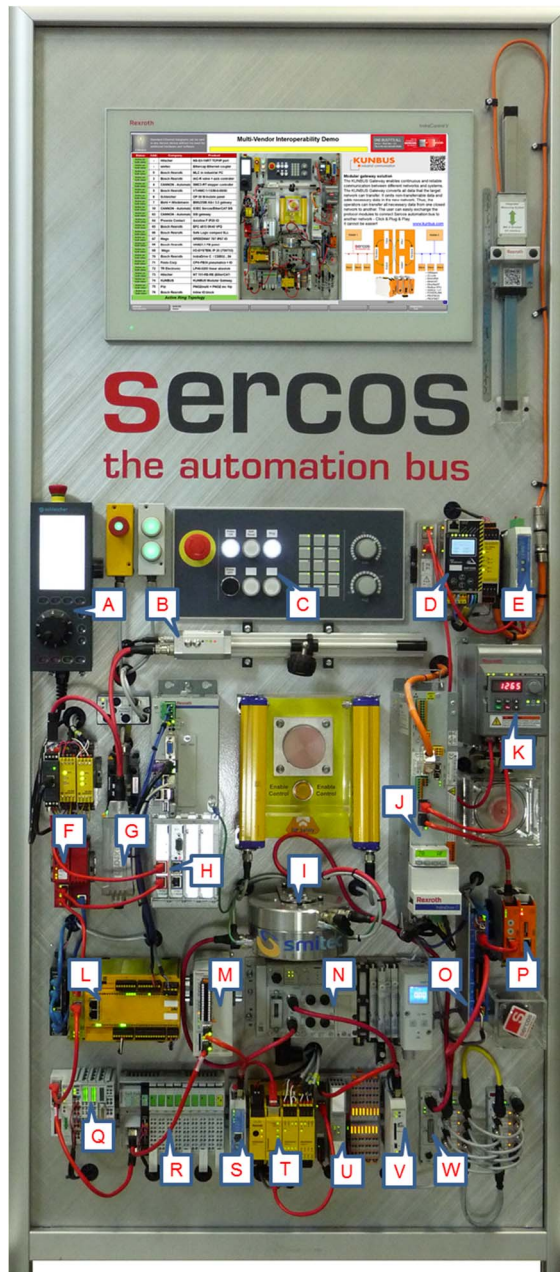
Using the touch screen, read about key Sercos technologies and select the demo overview screen and touch on a product to obtain product information and more. QR-codes link to additional product details. User interaction is encouraged: move the linear encoders; perform safe motion while the light curtain is broken; operate multiple safety systems; move the capacitive Ethernet coupler; command the VFD and stepper motors, explore gateways/bridges to other Ethernet networks and more.



Experience the Real-time Ethernet network redundancy by disrupting and restoring one Sercos Ethernet connection at a time. The Sercos device detects the interruption within one cycle, the Sercos master determines and indicates the point of interruption on the screen, switches to line mode and continues operating. After the Ethernet cable is reconnected, the network heals itself into redundant ring mode within one cycle while all functions continue working.

Product Descriptions

A The **Schleicher** ProNumeric OP 50 Mz provides an optimized human-machine interaction using real-time Ethernet such as Sercos automation bus, combined in one single hand-held control device, allowing connection of that device to different controls. User benefits are: fast key commands, operation with gloves, good illumination, fatigue-free operation and ease of use.
<http://schleicher.berlin/en/products/automation/hmi/operator-panels/>



B Linear measurement systems from **TR-Electronic** work via magnetostriction and thus are touch-less without wear or tear. Measurement strokes of up to 4 m are detected as absolute positions and at short cycle times. Measurement values can be read out directly to the Sercos automation bus. For machine integration, LP46 - ES3 linear absolute measurement systems are available in aluminum profile housings with several mounting options and with magnets guided by the profile. Tube housing type LA 46 is available in pressure-proof execution (up to 600 bar static, tested) for direct integration into hydraulic cylinders.



www.trelectronic.com/products

C The **Bosch Rexroth** IndraControl machine control panels VAM 21.1 / VAM15.1 connect simply to the 100 Mbit/s real-time Ethernet Sercos automation bus. The units are provided in a compact, easy to install design: E-stop, 6 push buttons with discrete contacts, knockouts for additional buttons, 15 keys/LEDs freely programmable with slide in labels, override for feedrate & speed, 16 digital inputs and 16 digital outputs and a handwheel (MPG) connector.



www.boschrexroth.com/cat-vam

D With the **Bihl+Wiedemann** AS-i Gateways one can transmit digital and analog data read remotely through AS-i 3.0 slaves to the host controller and set the output signals from the host controller to the actuators over the Sercos automation bus (and others). They are simple and quick to install and commission. Diagnostics functions for duplicate addresses, earth fault and EMC monitoring, as well as an



optional PLC functionality, are available. www.bihl-wiedemann.de/us/

Sercos Multi-Vendor Demo 2

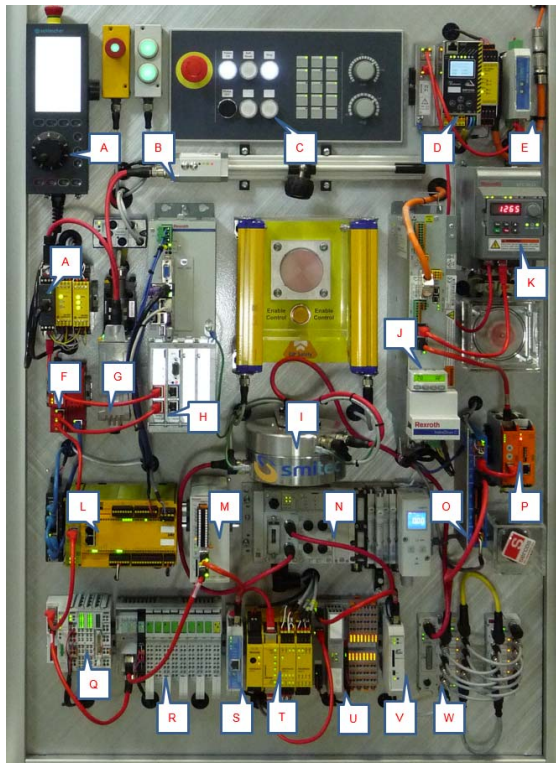
E The **CANNON-Automata** SSI-Gateway is a simple and inexpensive device that allows the connection of SSI absolute encoders from any vendor to the Sercos network, with up to four Sercos real-time data connections. Thus, it is possible to make the acquired position available to any other device connected to the Sercos network -- an important feature for applications with master and slave axes, cam profiles, or electronic gears. Position values and measured actual velocity and acceleration can be transmitted. www.cannon-automata.com/index.php?Sercos-SSI-Gateway-en



F Sercos real-time Ethernet provides deterministic jitter-free data transmission for control and synchronization. In parallel, standard Ethernet TCP/IP telegrams can be transmitted via the UCC (Unified Communication Channel). The **Hilscher** NS-S3-1NRT Gateway Switch TCP/IP buffers these Ethernet telegrams for communication between the synchronized Sercos and standard Ethernet. Two Sercos Ethernet ports plus one Ethernet port for connection to normal Ethernet devices are provided, maintaining ring topology and avoiding data loss on higher data traffic of Ethernet telegrams. www.hilscher.com



G **Bosch Rexroth** has gained unique knowledge about the interaction of hydraulic and motion control technology. The control strategies for hydraulic and hybrid drives are optimized on this basis and are represented in ready to use software. Directly operated IAC multi-Ethernet (4WRPDH) directional hydraulic control valves provide real-time enabled multi-Ethernet such as the Sercos automation bus (and others). This allows you to benefit through the flexible integration of the hydraulic axis control to the machine control network. www.boschrexroth.com/IAC



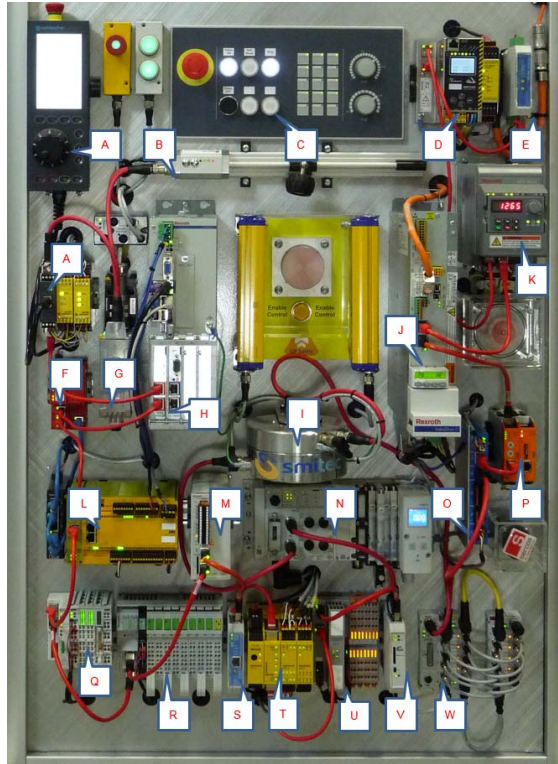
H Based on IndraControl VPB40.4, IndraMotion MLC from **Bosch Rexroth** is a powerful and flexible Industrial PC motion logic control solution. Hypervisor technology combines Windows and a real-time operating system on the same device, utilizing the multi-core i7 CPU to achieve the highest performance. CPU cores are dedicated for Windows and the IEC61131-3 PLC with motion control of up to 192 axes. Sercos automation bus, multi-Ethernet, OPC UA, WebConnector and Open Core Engineering make it the ideal controller for machines that connect to other systems – ready for Industry 4.0 and IoT. www.boschrexroth.com/cat-mlc



I The 10/100BASE-T Ethernet rotary coupler from **Smiter** comes in a compact aluminum IP54 housing for industrial applications. Capacitive coupling allows high-speed contactless communications between revolving parts on machinery and robots. www.smiter.it



J **Bosch Rexroth's** IndraDrive platform offers power up to 4 MW, with the lower power range covered by the standard IndraDrive C (HCS02/03) converter. Ethernet connectivity includes the highly synchronous real-time Ethernet Sercos. CIP Safety on Sercos (CSoS) offers easy integration with safety PLCs over one cable. The multi-encoder interface supports common encoder types. It features over 100 technology functions, optional IEC 61131 and PLCopen compliant motion logic. www.boschrexroth.com/cat-hcs02



K The power of **Bosch Rexroth's** line of EFC 3610/5610 frequency converters extends up to 90 kW. Featuring scalable option modules with Sercos automation bus, multi-Ethernet, Profibus, CANopen, I/O interfaces and a compact design, these frequency converters fit many applications. And they are particularly easy to parameterize using CoverterWorks with auto-tuning, copy function or USB port and they install without additional peripherals. www.boschrexroth.com/cat-efc3610



L The **Pilz** PNOZmulti configurable and modular safety system is suitable for implementing multiple safety functions in a system or on machinery. The PNOZmulti offers a large number of modules, such as speed or standstill monitors, safe analog input modules, a variety of base units and expansion modules, for example to the Sercos automation bus, using PNOZ mc10p. With PNOZmulti you can standardize your safety for numerous applications. www.pilz.com/en-INT



M The functionality of the single-axis HMC controller for hydraulic drives from **Bosch Rexroth** covers many applications. Key features: IndraWorks software for uniform setup; fast control (position, force, pressure, alternating position/force, velocity); fast Ethernet support (Sercos automation bus, PROFINET RT, EtherNet/IP, EtherCAT, PROFIBUS, TCP/IP); digital position transducers (SSI, EnDat2.2, incremental); analog 0 to ± 10 V and 4 to 20 mA; voltage or current actuating variable output; and PLC according to IEC61131-3. www.boschrexroth.com/HMC.

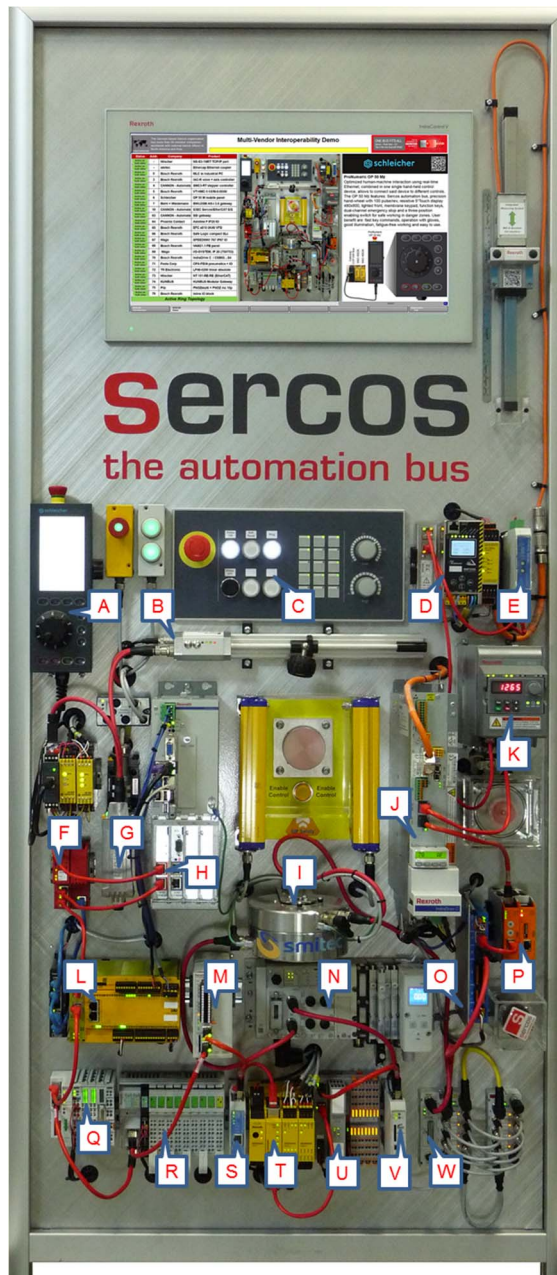


N The **Festo** CPX-FB39 electrical terminal offers scalable integration into higher-order controllers using the Sercos automation bus. It interfaces with general purpose MPA pneumatic valves, VPPM proportional valves, or ISO standard VTSA valves. Updates are accomplished via the free Festo Field Device Tool software. Channel- and module-oriented diagnostics include module under-voltage, short circuit, trace data, and more. CPX-FB39 provides access to acyclic/cyclic Sercos data, S/IP data, IP addressing via Sercos or operator unit, acyclic startup parameters and more. www.festo.us



Sercos Multi-Vendor Demo 2

O With the positioning mode of the SMC3 stepper motor controller from **CANNON-Automata**, such functions can now be quickly and easily integrated into Sercos automation bus networks. The drive profile (FSP-Drive), I/O profile (FSP-IO) for onboard I/Os, and the FG-Probe for touch probe function are supported for the Sercos automation bus. In addition to positioning mode, the SMC3 supports cyclic velocity and position set values -- with or without a connected incremental encoder.
www.cannon-automata.com



P The **KUNBUS** Gateway enables continuous and reliable communication between different networks and systems. The gateway converts all data that the target network can transfer. It omits non-transferrable data and adds necessary data in the new network. Thus, operators can transfer all necessary data from one closed network to another. The user can easily exchange the protocol modules to connect the Sercos automation bus to another network - Click & Plug & Play.
It cannot be easier! www.kunbus.com



Q Fine modularity and fieldbus-independence are hallmarks of the **WAGO**-I/O-SYSTEM IP 20 (750/753 Series). The bus coupler connects the WAGO-I/O-SYSTEM to the Sercos automation bus. The coupler is capable of supporting all WAGO I/O modules. The coupler automatically configures, creating a local process image which may include analog, digital or specialty modules. The coupler can integrate into the application as a Sercos I/O device and supports the Sercos service channel (SVC), real-time channel (RTC) and TCP/IP communication standard. Two integrated ports allow easy creation of a line or ring structure without requiring additional components.
www.wago.com



R The **Bosch Rexroth** Inline is a flexibly scalable modular I/O system with IP20 protection for time-saving installation in a control cabinet – locally at the IndraControl L or as distributed I/O stations on the Sercos automation bus. Removable connectors with cage clamps and 1 to 4 wire direct sensor/actor connection make it very compact and easy to install. A wide range of digital and analog I/O, temperature, communication and function module slices with fast performance is available.



www.boschrexroth.com/controls

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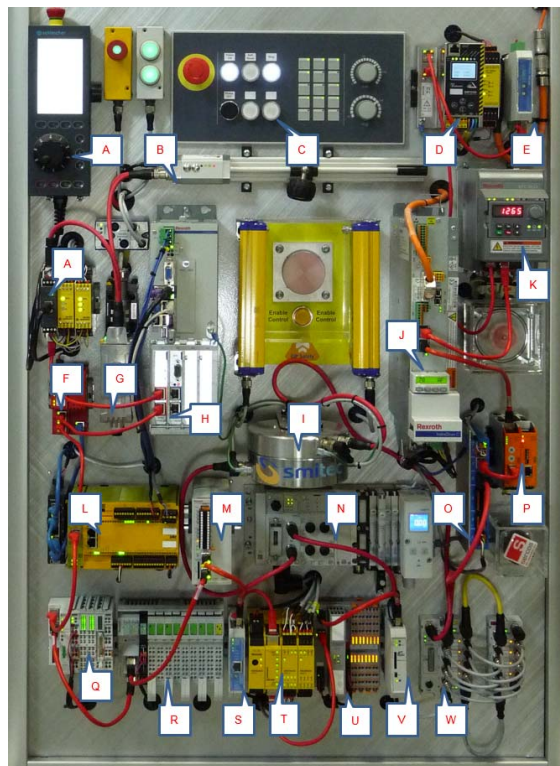
S The S3EC Sercos/EtherCAT-Bridge from **CANNON-Automata** connects Sercos automation bus and EtherCAT masters for bidirectional data exchange. It acts on both busses as an I/O device with adjustable length of real-time data. The S3EC supports the Sercos FSP-IO and EtherCAT DS-401 I/O profiles. Adjustable length of real-time data is 32-1024 bytes. It synchronizes the EtherCAT cycle with the Sercos cycle. Acyclic communication over the Sercos Service channel (SVC) and EtherCAT CoE is possible. Standard Ethernet communication uses Sercos UCC while EtherCAT uses EoE and an additional Ethernet port. www.cannon-automata.com



T With a system update time of 1 μ s per I/O module, Axioline F series I/O (IP20) from **Phoenix Contact** is able to fully exploit the potential of the Sercos automation bus, making it the ideal system for especially fast and synchronous applications. With a Sercos master, the jitter is only ± 10 ns. The precision of the synchronization is under 20 ns. A simultaneity of under 100 ns is achieved. www.phoenixcontact.com



U The SafeLogic compact (SLc) from **Bosch Rexroth** provides safe logic processing in small to mid-range machines. Defined function blocks and graphic wiring simplify configuration and speed up the commissioning process. Using the Sercos gateway module, the safety logic directly communicates to the safety certified IndraDrive using CIP Safety on Sercos and provides status to the supervisory controller, e.g., a PLC. www.boschrexroth.com/cat-slc



V The **Hilscher** netTAP 151 gateway transmits bidirectional IO data (<10ms) between any two industrial real-time Ethernet networks. There are 25 different combinations of the protocols for the Sercos automation bus and other Ethernet protocols such as PROFINET, EtherCAT, EtherNet/IP and POWERLINK. Integration as a simple IO device into the primary network makes the converter compatible with any common PLC. Secure network separation is provided by two Ethernet controllers, each connected to a dual Ethernet port with integrated switch. <https://www.hilscher.com/products/product-groups/gateways/for-the-control-cabinet-ip20/real-time-ethernet-gateways/>



W **WAGO's** modular SPEEDWAY 767 I/O-System boosts the performance of IP67-rated components. The 767-1311 bus coupler links the WAGO SPEEDWAY 767 system to the Sercos automation bus. Its station structure generates the required process images of the configured I/O, which can be a mix of analog,

digital or complex I/O modules. The Sercos service channel (SVC), real-time channel (RTC) and IP channel (UCC) are supported for standard TCP/IP communication. Two Ethernet ports allow the creation of a line and ring structure without additional components. Each port supports Auto MDI/MDI-X and automatically detects the direction of transmission. Sercos address assignment can be done via switch 10, either using the operation panel (switches) or software (retentive memory). In addition, the fieldbus coupler has 8 digital inputs to capture binary signals from switches and sensors. www.wago.us



The Sercos automation bus

The SErial Realtime COmmunication System, or Sercos, is one of the world's leading digital interfaces for communication between controls, drives and decentralized peripheral devices. Sercos has been used in machine engineering for approximately 25 years and is implemented in nearly 6 million real-time nodes. With its open, manufacturer-independent Ethernet-based architecture, Sercos III is a universal bus for all automation solutions.

An efficient and deterministic communication protocol based on an optical transmission system for high noise immunity is the foundation for Sercos' success. Today Sercos is used successfully in the most varied market sectors and applications. Sercos has established itself as the de facto standard for challenging applications that place great demands on dynamics and precision. However, Sercos not only specifies a real-time-enabled communication system, but goes much further and specifies over 700 standardized parameters which describe the interaction between control systems, drives and other peripheral devices using universal semantics. This creates a basis upon which devices from different manufacturers can be combined without any problems.



The Sercos user organizations

Sercos North America (Sercos NA) is the North American Sercos User's Group. Sercos Asia consists of groups in Japan and China. All operate as independent organizations, closely affiliated with Sercos International.

Sercos International is an association of users and manufacturers that is in charge of technical development, standardization, certification and marketing for the Sercos automation bus. All rights to the Sercos technology are owned by the association, not by any one company. Any manufacturer can implement the Sercos technology, which is described by IEC standards. Conformance tests guarantee that Sercos implementations are standard-compliant, ensuring that devices from different manufacturers are interoperable.

Based in Germany, Sercos International presently has more than 90 member companies located around the world.

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