SIGMATEK

Automation System

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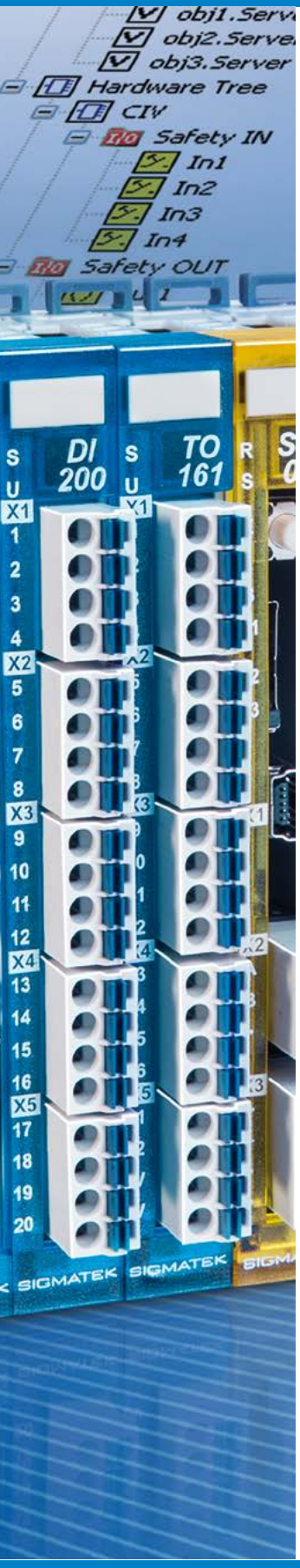
Contents



Technology, customer orientation, future-proof

Company

SIGMATEK is a globally successful enterprise. For 25 years, we have been researching, developing and producing automation technology. We offer our customers modern and flexible automation systems from one source, with a "certain added value" in the engineering of machines and plants.

Solid and Flexible Structures

SIGMATEK was founded in 1988 and is 100% privately owned. A flat organization structure and quick decision making processes are characteristic of our company. Therefore we can react quickly and flexibly to the needs of the market. A first-class product spectrum, solution expertise, highly motivated employees and long-term customer relationships - those are the key factors of our success.

The SIGMATEK founders and management team: Andreas Melkus, Mag. Marianne Kusejko, Theodor Kusejko (from left to right).

With Us, Innovation has Tradition

We accept this challenge. Innovation is the result of our passion for the continuous improvement of products and solutions. 18% of the annual turnover is invested in research and development. With innovative new and improved designs, we set trends in automation technology and thereby ensure the future of your designs and machines.

Our Principles

- **Universal:** fully integrated automation solution
- **Efficient:** fast "Time to Market" for your machine
- **Expertise:** support with our experienced branch experts
- **Future-Proof:** long-term availability of our components

Integrated System Solutions

SIGMATEK focuses on complete automation solutions with integrated drive technology and an integrated engineering environment - including Safety. The engineering labor is therefore reduced, the performance and flexibility of your machine are decisively increased.

Modular and Flexible

Our automation systems are modularly constructed like a tool box. The compatibility and scalability of the components are ensured, as well as their long-term availability. This modularity offers machine builders an important competitive advantage: they can implement various customer requirements flexibly and efficiently.

Our product spectrum is always up to date with the latest technology: controls, I/Os, drives, HMI, real-time Ethernet as well as engineering tools. All SIGMATEK automation system components are produced in the main facility in Lamprechtshausen, Salzburg. They are the result of consistent research and continuous development as well as high quality standards in production.

Highlights

- **Made in Austria:** all automation components from one source
- **Broad spectrum:** the right product for any requirement
- **Simple engineering:** one tool for every task
- **Economic:** low "Costs of Ownership" through an integrated approach

Broad Industry Know-How

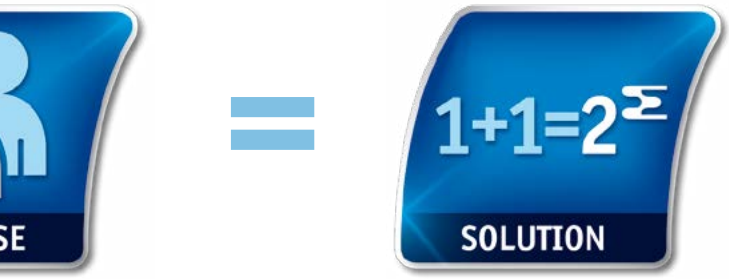
We are at home in automation. With our long-term industry experience, we can give our customers innovative ideas and support them in implementing their machine concepts with well thought-out automation solutions.

SIGMATEK has combined expertise and broad experience from various application areas and industries. We understand your specific needs, have a feeling for trends and quickly develop them into serial products.

Naturally, we love technology but our main focus is the customer advantage. We listen attentively to our customers, have many years of machine expertise and never lose sight of the big picture. That is how we are able to transform our customer's needs into tailor-made industry solutions.

At Home in Many Industries

- Plastic technology
- Robotic and handling systems
- Glass technology
- Packaging and food production
- Energy and environment
- Textiles
- Printing and paper
- etc.



Close and Successful Engineeri

Long-term and successful partnerships are our goal. We would like to inspire customers and give them a market advantage with our expertise and know-how. This way, we can grow and evolve together.

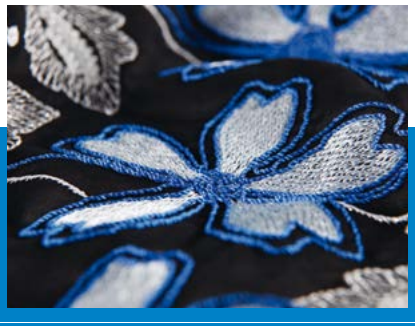
Always Close to the Customer

Anyone who knows their customers as our sales engineers do, finds the right solution faster. Only in a strong partnership based on trust, continuity and transparency, is extraordinary service possible.

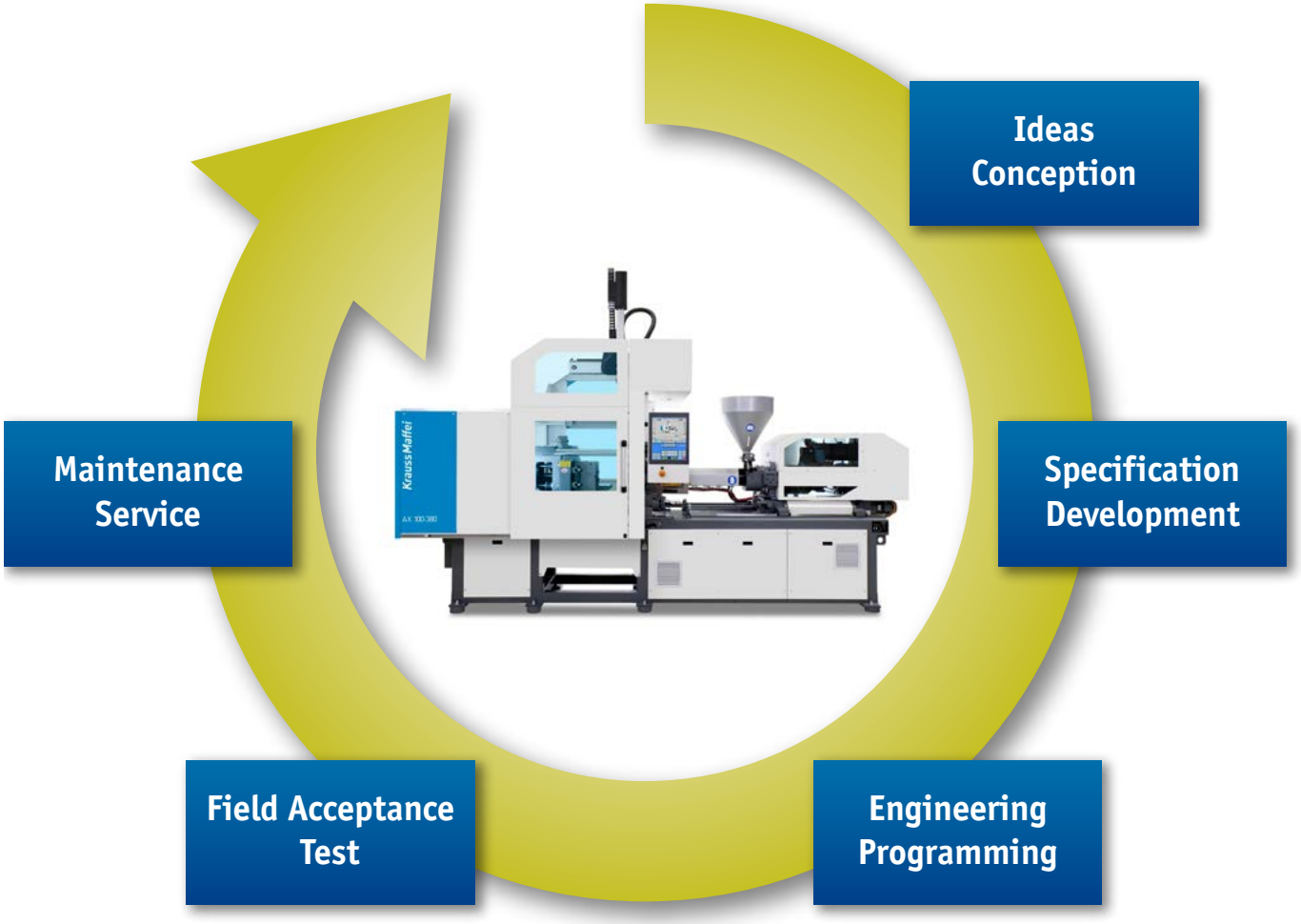
Our customers know that they can rely on SIGMATEK. We keep our delivery dates and score with flexibility in applications support. We are always close to the customer: whether in engineering support, on-site initial start-up, employee training or support through remote maintenance using web technologies.

The Right Mix is Essential

We put ourselves to the challenge and together with you, we find the optimal solution. Standard components, which can be combined and individually customized, are the basis of our automation solutions. Through this modularity, you acquire tailored-made automation solutions. Our application engineers support you with their wide-ranging project experience. Thus from top components, successful and unique solutions and machines are produced.



ing Partnership



Our core expertise is integrated complete solutions. For the customer, this has the advantage that for all automation questions, there is only one contact person. With a complete overview of the machine process, we offer an individual 360° solution for the entire life cycle of your products: from finding a solution, project development to the application engineering and the field acceptance test to service and remote maintenance - as long as your machine lives.




More flexibility and higher productivity for

Fully Integrated Automation

Our control system offers the right CPU for any task: from the compact control, through the ETV control panels to powerful IPCs with EDGE technology. Naturally our control system is scalable and integrated and therefore the user software is also compatible. The I/O modules are also available in four type series and a wide variety of configurations.

For human-machine interfaces, a broad product palette is available: from small units with 5.7" displays to high-resolution touch panels with a display up to 19". In addition to classic visualization, the ETV control panels also perform control tasks. Naturally customer-specific variants are possible, for example, HMIs that are especially designed for the strict requirements of the food and pharmaceutical industries.

With the modern Motion Control System, SIGMATEK offers complete drive solutions: motors, servo drives and software interact perfectly and are seamlessly integrated into the control system. This results in highly dynamic motion processes from one source. Engineering is simple. The precision, flexibility and efficiency of the machines are increased.

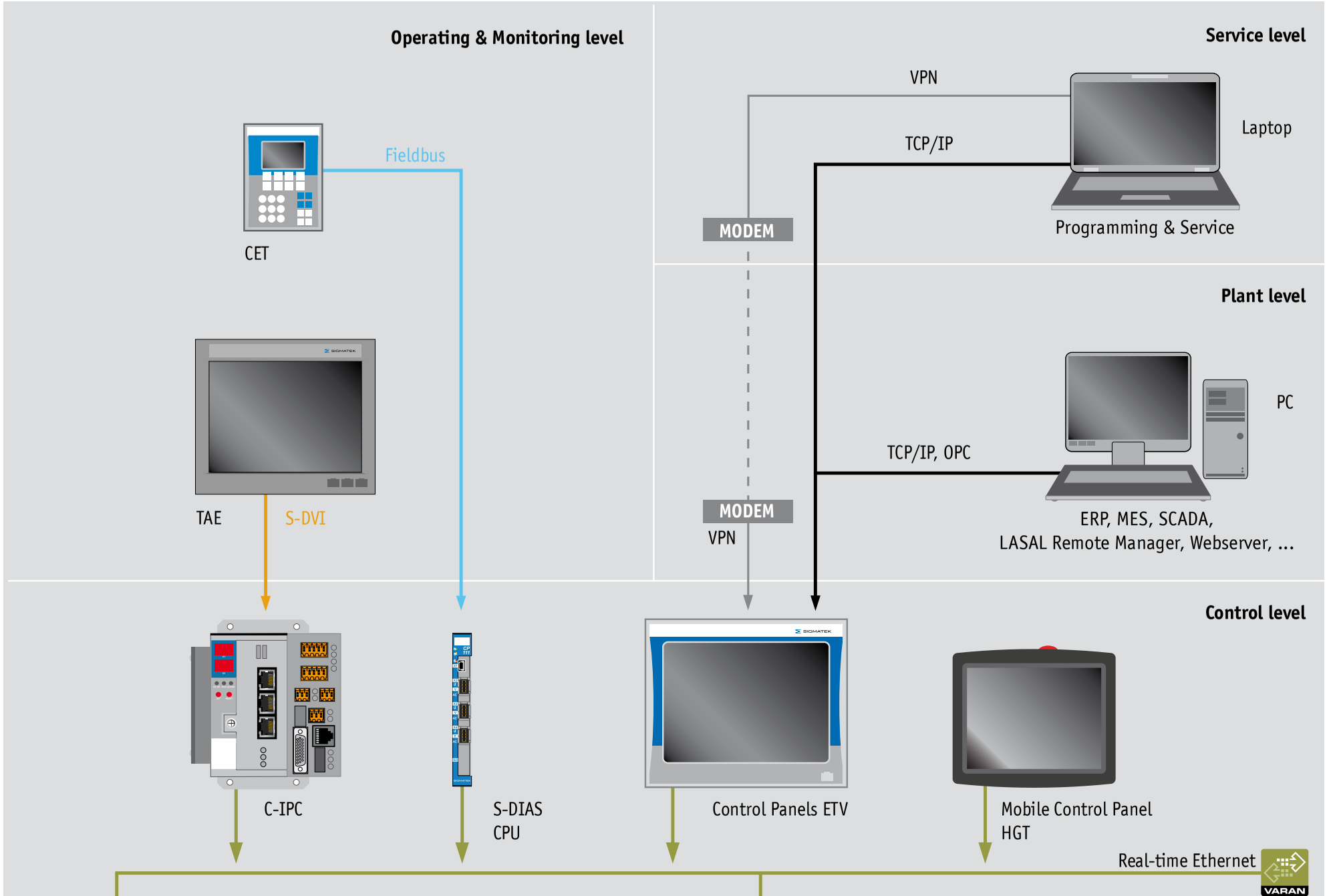
your machine
System

SIGMATEK has fully integrated Safety into the automation solution: Safety CPU, Safety I/Os and drives with integrated Safety technology. For networking, the real-time Ethernet bus VARAN is used, which can transport standard as well as Safety data - the need for separate wiring is therefore eliminated. The modern Safety technology simplifies machine construction and results in significantly easier engineering.

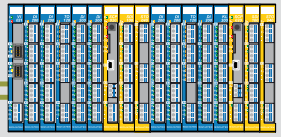
The Ethernet technology based VARAN bus system was designed for flexible and modular machine concepts. Today, integrated hard real-time capable communication is the key to modern automation systems. With cycle times of 100 µs and less than 100 ns of jitter, machines are more productive and precise. VARAN also gives the user complete freedom during project development through various network topologies.

The all-in-one engineering tool LASAL allows machine concepts to be realized quickly and efficiently: PLC programming, HMI, motion control, Safety, diagnostics and service. In 2000, SIGMATEK was the first to introduce object oriented programming to industrial automation. The reusability of the software modules helps to reduce the engineering time and costs significantly.

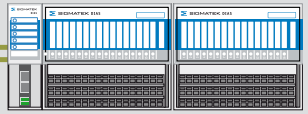
SIGMATEK System Architecture



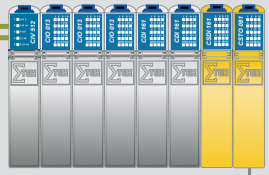
Field level
Line topology



I/O System S-DIAS
with integrated Safety



I/O System DIAS



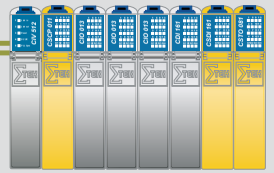
I/O System C-DIAS
with integrated Safety

I/O System P-DIAS

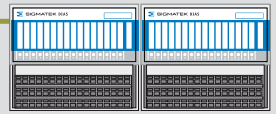
Field level
Star topology

Gateway to other bus systems
(Profinet, etc.)

Splitter



I/O System C-DIAS
with integrated Safety

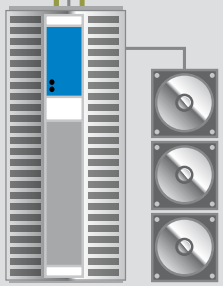


I/O System DIAS

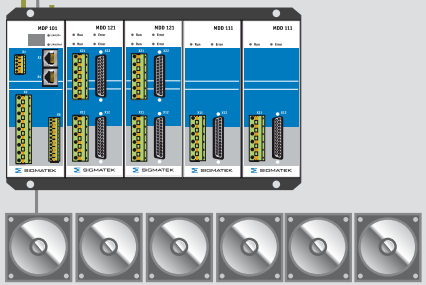
I/O System S-DIAS
with integrated Safety

I/O System P-DIAS

Drive level

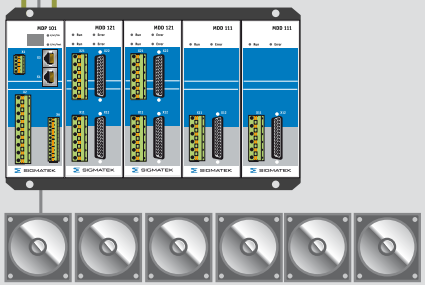


DIAS Drive 300

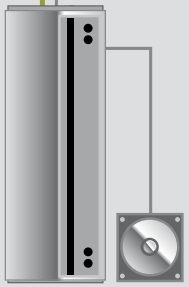


DIAS Drive 100

Drive level



DIAS Drive 100



Servo drives
other manufacturers

From simple machines to complex systems

Control System

For control applications, various systems are available: from compact CPUs to control panels with integrated visualization. We use different processors: from high performance, low power loss EDGE technology to Intel Atom™. All controls are scalable and compatible with one another.

Scalable: grow with the task

Control CPUs

The CPUs impress with their especially compact form. The right control is available for any task: from economic processor modules to the C-IPC, which was designed for high performance machines. With its compact design, the C-IPC also finds space in small control cabinets.

For harsh industry environments

Industrial PCs

The IPCs from SIGMATEK perform control as well as visualization tasks. The optimal processor is available for any application. With the use of Intel Atom™ processors, the IPCs provide high computing performance at low power consumption and minimal exhaust heat. Furthermore, the PC 322 is equipped with the innovative HMI-Link technology. Independent from the operating system, Ethernet, DVI, audio, USB signals can be transmitted without loss up to 100 m over a single standard Cat5e cable.

Control and visualization unified

Control Panels

The ETV control panels and HGT robot operating devices are all-in-one panels. They unify control and HMI in one compact device. In the control cabinet, space is saved and the amount of wiring is reduced. Different processor variations and display sizes open a diversity of configuration possibilities. The user therefore acquires economic automation hardware. Decentralized solutions are simple to implement through the integrated VARAN interface.

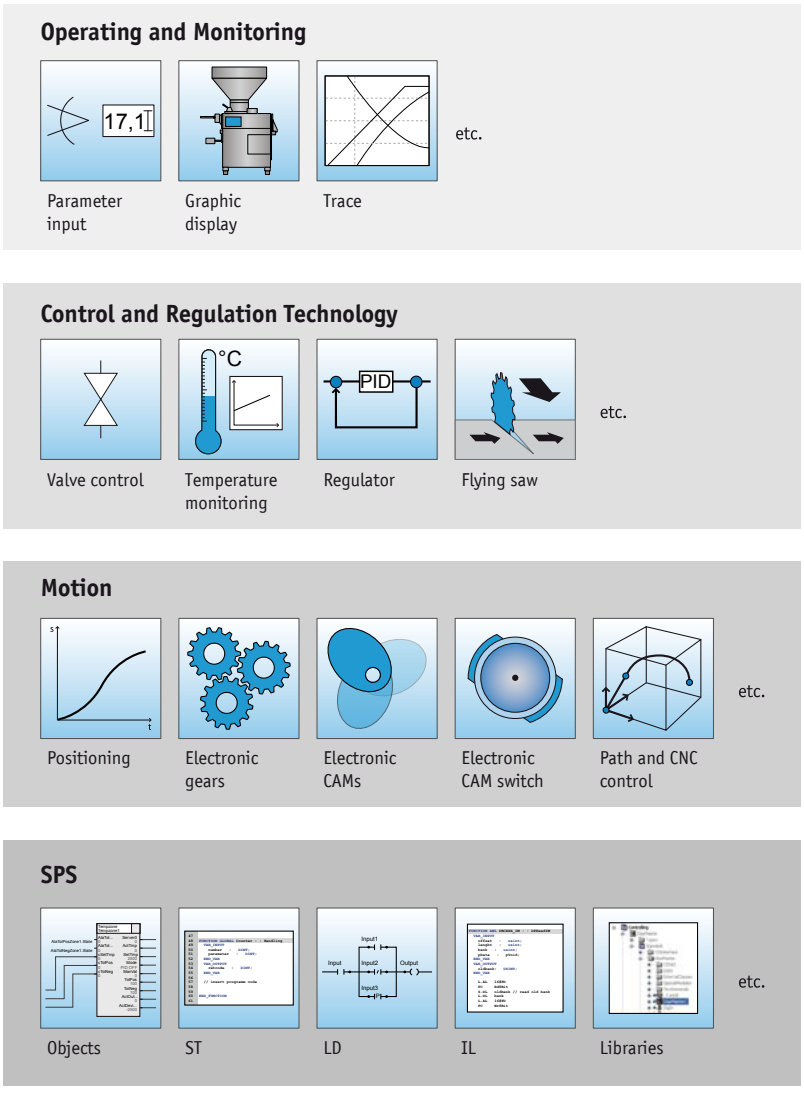
The TFT color displays with touch screen provide high operating comfort. New to the program, are capacitive multitouch panels as well as haptic touch screens, which further increase the usability. The software also follows the integration concept and simplifies programming.

Highlights

- **Scalable:** the right CPU for any requirement
- **Integrated:** application software compatibility
- **Compact:** space-saving installation in the control cabinet
- **Simple:** one engineering tool for any task

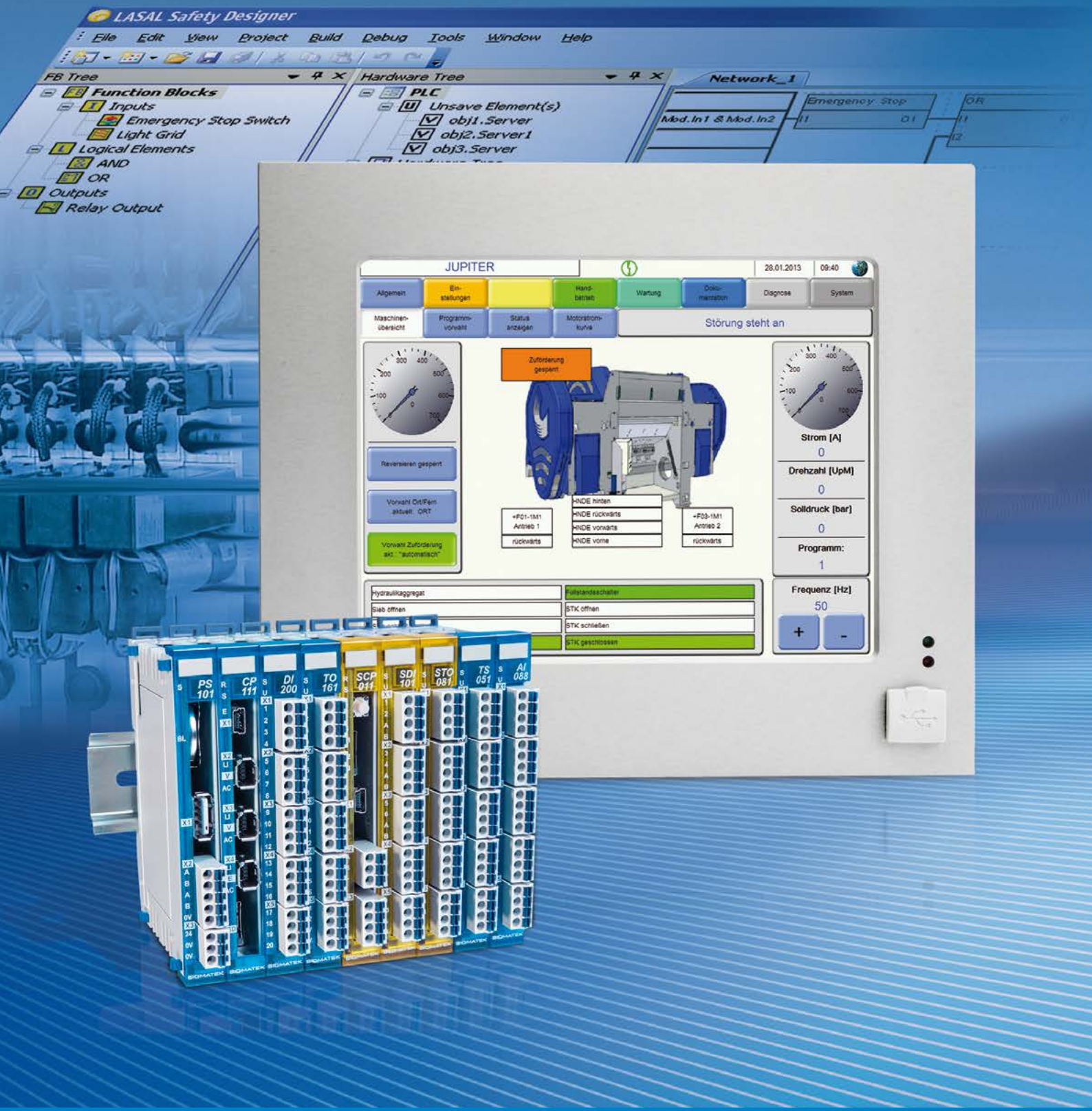
Predefined Software Functions for any Mission

The SIGMATEK system concept offers all control disciplines required for a production machine from one source. Naturally, all PLC functions are available for such tasks as sequential control, monitoring, I/O processing and calculation. In addition to the PLC functions, there are often technological machine building tasks in the areas of control technique, operation and monitoring as well as motion control that must be performed. For these, the SIGMATEK automation system provides technology objects. They cover a broad spectrum, which ranges from temperature monitoring, ventilation and various control algorithms to motion control for various mechanical units. The full integration of PLC, motion control, technology functions and visualization results in simplified machine engineering.



Through standardized controls and technology functions, the modular tool box principle is transferred from the hardware to the software.

"Integrated system solutions guarantee maximum flexibility and efficiency“



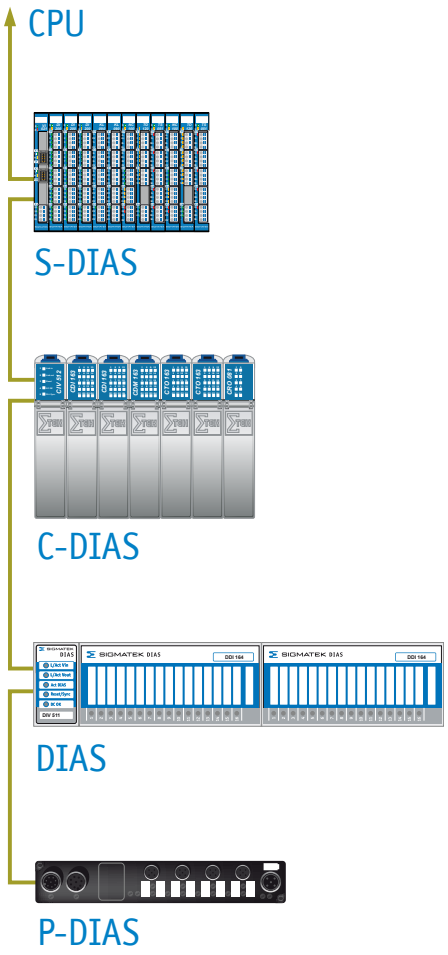
Compact, modular, robust

I/O Systems

The I/O systems are available in four different type series: S-DIAS, C-DIAS , DIAS and P-DIAS. The component groups can be used modularly and impress with their compact form and functional diversity.

The user is provided with a modular system family that meets IP20 as well as IP67 standards. All three type series can be combined as desired and communicate with one another without limitations and performance loss. A decentralized configuration with several module groups, networked over the VARAN bus, is therefore possible. Different network topologies (star, line, tree) contribute to the modular construction principle of machine concepts.

Our systems are open for communication with components from other manufacturers. For this purpose, various interface modules are available. Individual machines can therefore be easily connected to complex production lines.



The four DIAS type series can be combined as desired. The configuration can be local, decentralized or a combination of both.

The perfect choice for any task

Module Variety

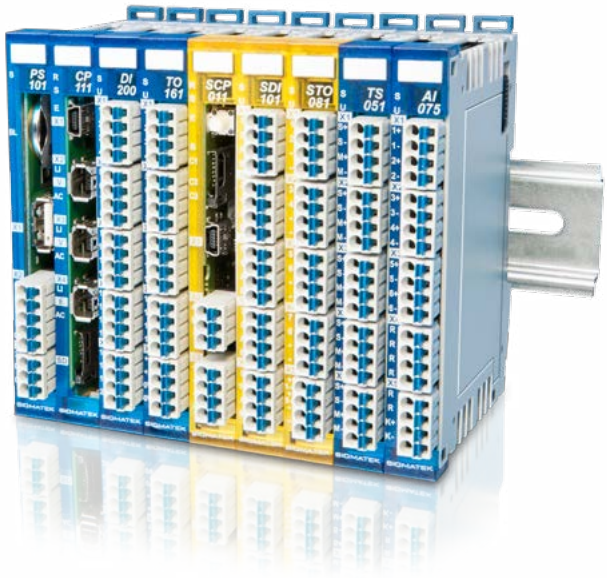
SIGMATEK's many years of experience have produced a variety of modules. Whether digital, analog or mixed, whether input, output, Safety, function or special modules: In all component series, trend setting designs have become standard products that can be modularly and individually combined to meet any need.

Highest package density

S-DIAS I/O System

The new, super compact I/O component series has the highest package density to date. With S-DIAS, SIGMATEK focused on a robust complete solution: DIN rail mount, electronics and bus are combined in one housing. This allows the modules, which can be preassembled into blocks, to be quickly mounted without tools. Since standard connectors with push-in wiring that can be easily removed for preassembly or servicing are used, the mounting and wiring times are reduced to a minimum.

Per VARAN bus interface, 64 I/O modules with up to 1,280 I/Os can be mounted. The update time here is under 60 µs. Module status LEDs and signal LEDs located directly next to the channels provide clear organization. The S-DIAS I/Os are mechanically interlocked. Both the module supply and bus connection are equipped with multiple contacts. The highest mechanical reliability and vibration resistance are therefore achieved. Standard and Safety systems can be combined as desired.



Highlights

- **Highly compact:** 20 I/Os within a width of only 12.5 mm
- **Comfortable:** through toolless DIN rail mounting and push-in wiring
- **Clear:** signal LEDs directly next to the channels
- **Reliable:** mechanical interlocking, all connections with multiple contacts

Module variety including safety

C-DIAS I/O System

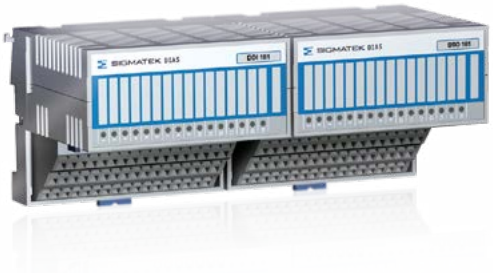
In addition to standard modules, the C-DIAS series also provides TÜV-certified Safety components. The compact modules are simply mounted onto the module carrier, into which the electrical connection between the modules is already integrated. The module bus provides fast communication within the module carrier. All connections are equipped with standard connector plugs and allow a comfortable exchange of the individual modules without having to remove the wiring. Prefabricated cables with connectors simplify installation.

Highlights

- **Flexible:** broad product spectrum
- **Modular:** individual configuration including Safety
- **Compact:** up to 16 I/Os within a 25 mm width

Easy to install

DIAS I/O System



The DIAS series is the „classic“ among the SIGMATEK I/O systems. An I/O station consists of a terminal block mounted on a DIN rail and a snap-on function module. The entire field wiring is integrated directly into the terminal block with 3-wire connection technology. No additional connector terminals are therefore necessary. The function module can be exchanged without having to remove the field wiring.

Highlights

- **Flexible:** broad product spectrum
- **Service-Friendly:** 3-wire connection technology
- **Comfortable:** simple installation

For harsh environments

P-DIAS I/O System

The P-DIAS modules expand the family of I/O systems into the IP67-protected area. They are ideal for the decentralized configuration of control systems and can be combined with other components as desired. The analog and digital data can therefore be collected or distributed outside of the control cabinet. Peripheral components are connected with M12 connectors, which are optimized for harsh industrial application.

Highlights

- **Robust:** used directly on the machine (IP67)
- **Simple and comfortable:** through preassembled cables with M12 connectors

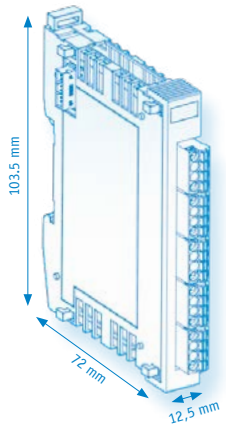
Broad Module Palette

In the various DIAS component series, numerous modules for different automation requirements are available, which can be combined as desired.

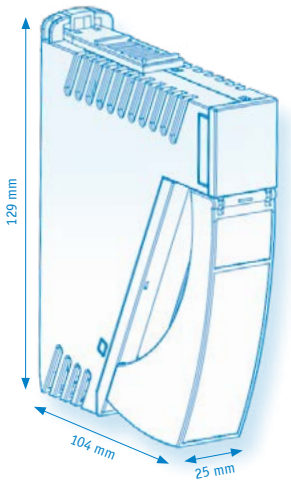
Module type	S-DIAS	C-DIAS	DIAS	P-DIAS
CPU modules	x	x		
Digital input	x	x	x	x
Digital output	x	x	x	x
Analog input	x	x	x	
Analog output	x	x	x	
Digital/analog mixed modules	x	x	x	
Angle/distance measuring modules	x	x	x	
Communication modules	x	x	x	
Stepper/DC motor modules	x	x	x	
Measuring technology modules	x	x	x	
Safety controller	x	x		
Safety input	x	x		
Safety output	x	x		
Safety relay output	x			
Safety combination module	x*	x		
Interface modules	x	x	x	
Diverse special modules	x	x	x	x

* Expected availability: 2nd quarter 2014

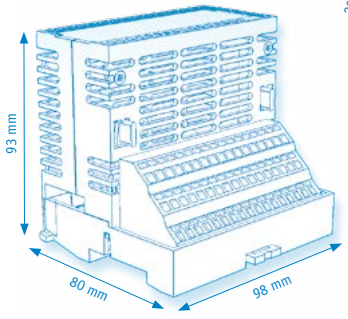
Module Dimensions



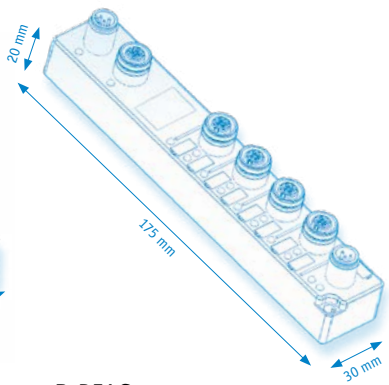
S-DIAS



C-DIAS



DIAS



P-DIAS

Simple and comfortable visualization

Human Machine Interface

SIGMATEK offers a broad spectrum of HMI panels. While developing our HMI units, great focus was placed on a compact design and comfortable operating properties. The engineering tool LASAL SCREEN ensures the optimal integration into the system.

The variety of HMIs ranges from simple, non-intelligent operating terminals to panels with an integrated control; from two-line text terminals to high resolution color displays with touch screen. State of the art technologies such as multitouch panels and touch screens with tactile feedback provide the highest usability.

The panels also vary in size: from 5.7" up to 19". Naturally, all HMI panels are fanless and therefore wear-free. Touch screens are also available for harsh environmental conditions. The right solution for any job is thus guaranteed.

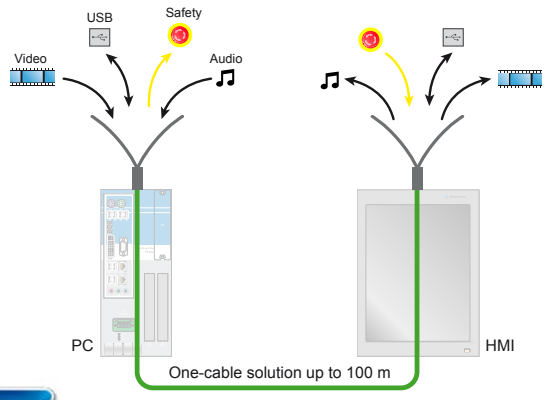
With or Without Integrated Control

The intelligent control panels with an integrated CPU unify visualization and control in one compact device. This results in space-saving and economic automation solutions for our customers. The performance of the CPU is scalable and the control can be simply expanded with additional peripheral components. Labor-intense wiring of the display is therefore eliminated.

The mobile operating devices of the HGB and HGT (integrated control) family cover various applications in robotics, assembly and material handling technology.

To meet branch-specific needs, as in the food and pharmaceutical industries for example, customer-specific housing variants can be provided.

HMI-Link: Remote Solution up to 100 m



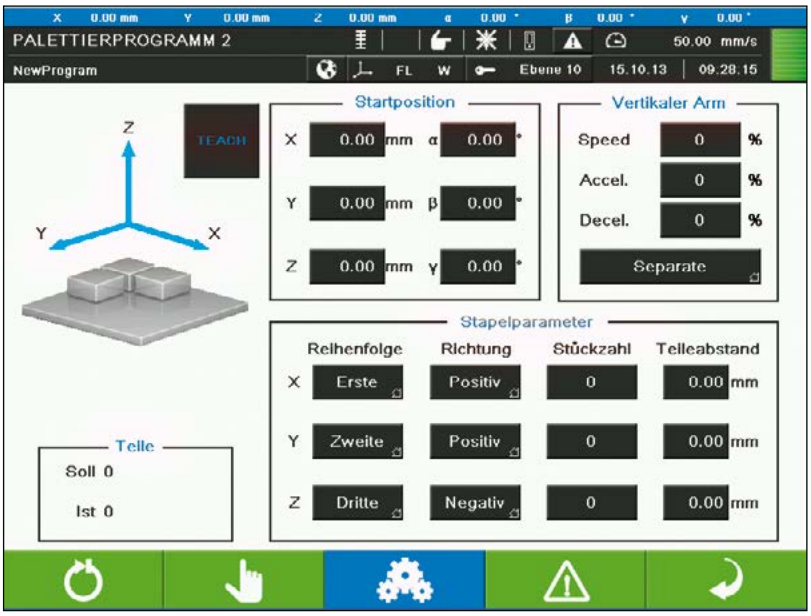
One cable, more power and great distances – these are the benefits of the new HMI-Link technology, which was designed for remote solutions. With a standard Cat5e cable, Ethernet, DVI, audio and USB signals can be transmitted up to 100 meters between the operating panel and control cabinet PC without loss (Full HD). HMI-Link is based on a pure hardware solution and is operating system-independent. The HMI-Link panels have no internal processor and are therefore more robust and inexpensive.

Strong Visualization

With the HMI tool LASAL SCREEN, the user is provided with a comfortable tool for visualization on all SIGMATEK graphic display units.

A large pool of predefined display and design elements (Library) simplifies project development. Alarm and event management, trend display, bar diagrams and recipe management are also included. Graphics can be comfortably created in the company's corporate design.

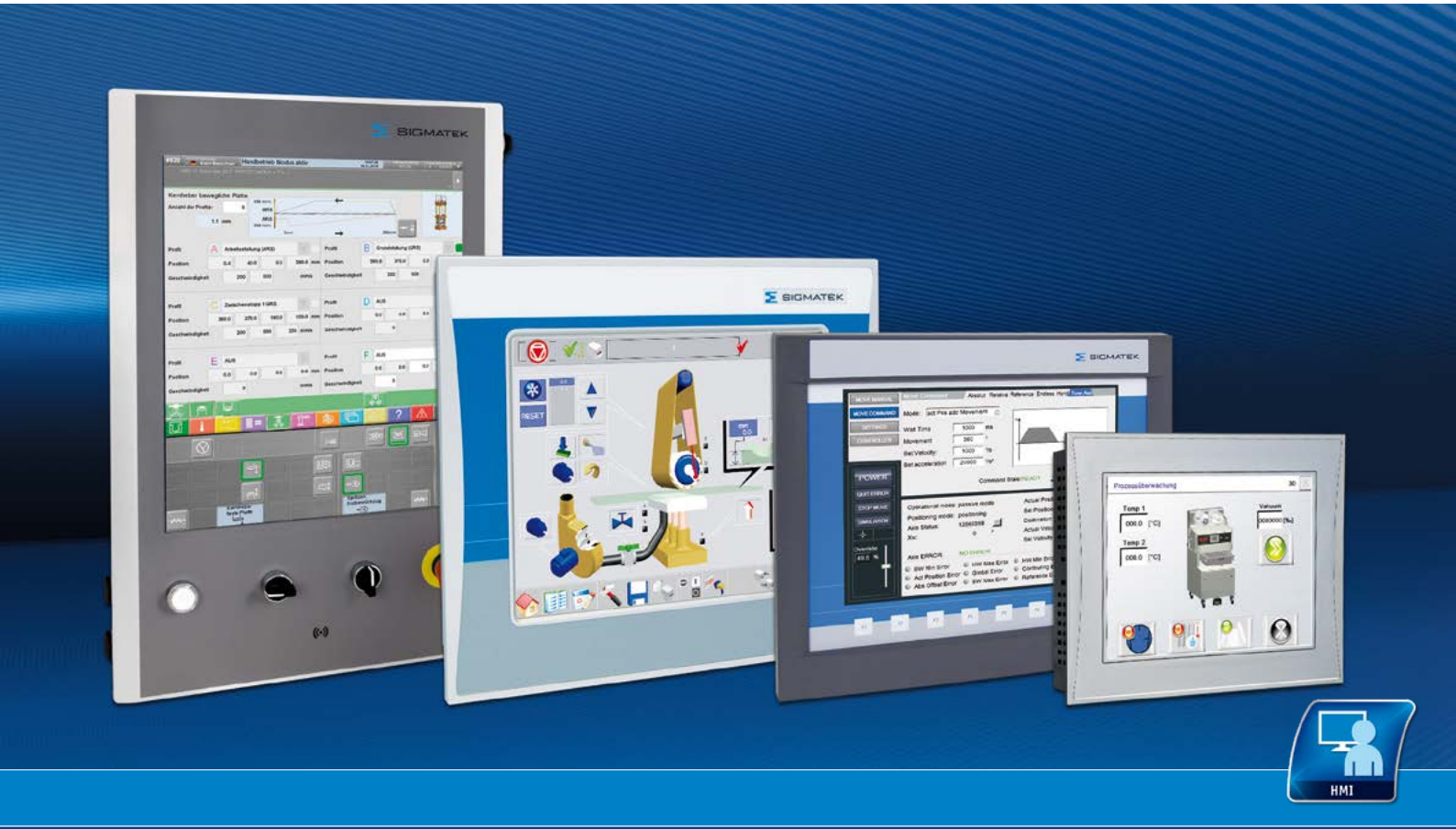
LASAL SCREEN supports all resolutions for the various SIGMATEK displays. In the target, the operating mode – touch screen, keyboard and/or mouse can be selected. Language settings and measuring units can be converted with the push of a button.



LASAL SCREEN ensures comfortable visualization.

Highlights

- **Scalable:** the right panel for any task
- **Simple:** comfortable screen design with the all-in-one Engineering Tool LASAL
- **Adaptable:** customer-specific housing design



From positioning to complex motion and CNC control

Motion Control

Modern machines and plants require innovative drive technology with maximum flexibility and precision. The economic solution from SIGMATEK offers a high degree of freedom to perform motion tasks with your machine.

Motion control is completely integrated into the control system at SIGMATEK. Control, drives, motors and software interact perfectly and allow highly dynamic and exact movement processes from one source. The control provides extensive motion control functions.

The functions of the servo drives were consciously limited to current, speed and position control to avoid unnecessary overhead. With this thought-through "reduce to the max" approach, an optimal price/performance ratio is achieved.

All parameter and configuration data as well as the motion cams for the drives are centrally stored in the control and automatically reloaded when a servo drive is exchanged; the handling during start-up and servicing is simplified.

This modern control structure is made possible by the hard real-time capable Ethernet system VARAN with the shortest cycle times. With this type of system architecture, cross traffic between the axes is unnecessary.

Drives to Meet any Need

The DIAS Drives cover a broad performance spectrum. Servo, linear, torque and asynchronous motors can be controlled. The drives contain the most important safety functions and are easily integrated into the Safety concept of the machine.

Highly dynamic servo applications are realized with the modular servo DIAS Drive 100 system.

Modular multi-axis system

DIAS Drive 100

DIAS Drive 100 is a compact, modular servo drive system, that was designed for highly dynamic machines in the mid and low power range. Up to eight axes can be mounted on a module carrier with simple snap technology and that with an installation space of only 300 mm x 155 mm x 152 mm (W x H x D).

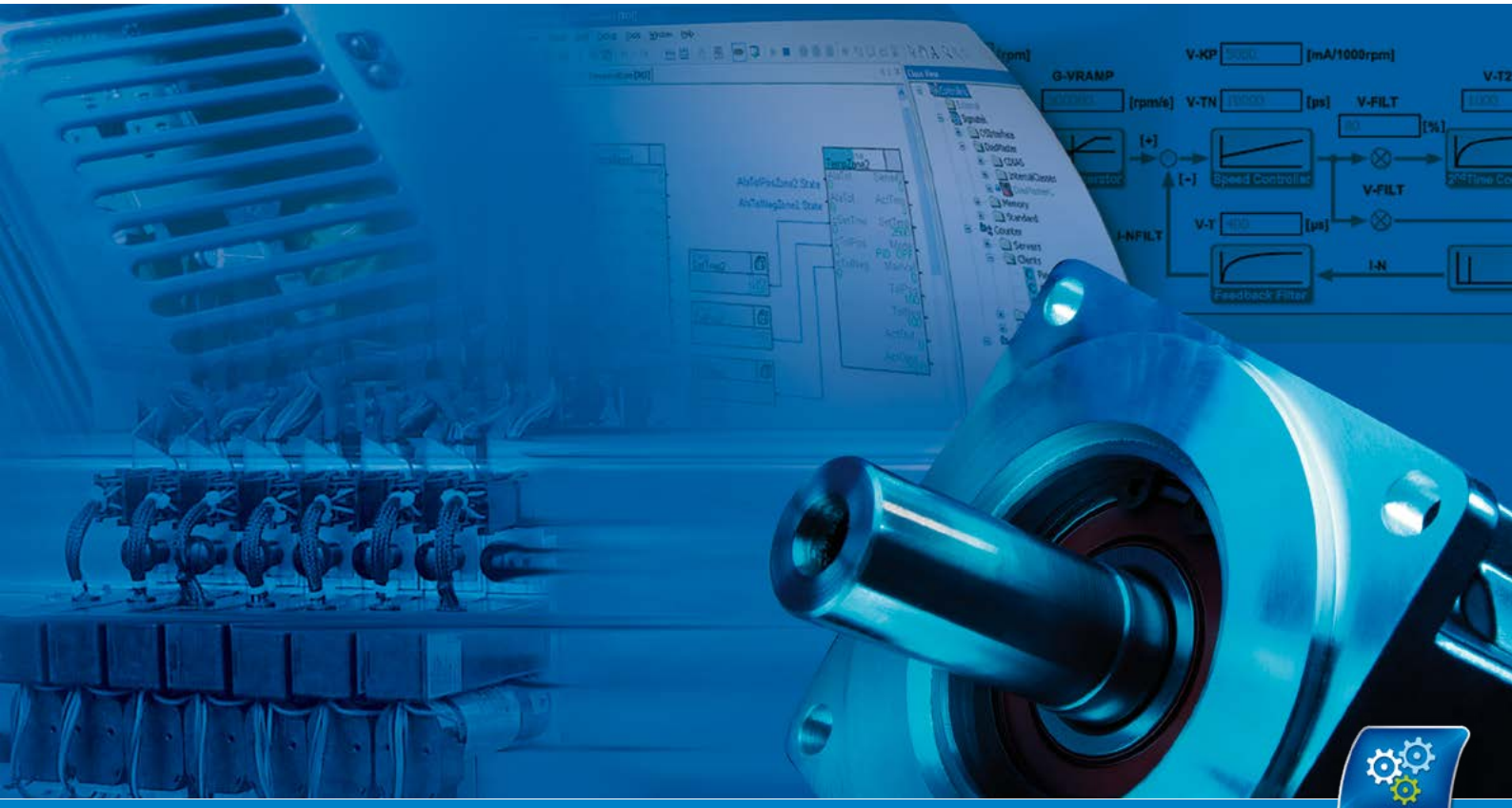
Two supply modules as well as axis modules for 1 or 2 servo drives in a power range of up to 3 kW are available to choose from. This allows the drive concept to be flexibly tailored or scaled to the required number of axes.

All common feedback systems can be used. The integration of ballast resistance as well as optimized power consumption contribute to the small installation space and minimal labor.

The flexible drive system allows the homogeneous integration of economic asynchronous motors into the axis system with highly dynamic servo motors.

Highlights

- **Simple:** integrated motion control simplifies engineering
- **Comfortable:** predesigned technology modules
- **Compact:** space-saving installation in the control cabinet
- **Flexible:** control of various motors



Compact 3-axis system

DIAS Drive 300

Up to three drives are integrated into the DIAS Drives of the 300 series and this with a size of only 158 mm x 378 mm x 240 mm (W x H x D). This results in an optimal price/performance ratio for robot and handling systems in particular and space savings in the control cabinet. The servo drive system is designed for multi-axis applications in a power range of 8 to 14 kW. High degree of efficiency, reduced power loss and an optimized cooling concept are additional arguments for using DIAS Drives 300. All common motor types and feedback systems are supported.

Motors for any motion task

AKM Servo Motors

The synchronous servo motors of the AKM series are compact power packs for highly dynamic motion tasks: they convince through a high power density and a very large torque/inertia ratio with rotation speeds up to 8000 rpm. Different application areas require different motors: therefore, a broad palette with rated torques from 0.17 to 105 Nm and peak torques up to 668 Nm are available. In addition, the user can also select the optimal motor from different mounting, connection and feedback variations.

Compactly control stepper motors

VST 011 and 012

The VST 011 and VST 012 are ultra light compact function modules used to control 2-phase stepper motors with a rated voltage of 18 to 70 VDC - dimensions: 26 mm x 151 mm x 121 mm (W x H x D). Microstepping (32-step) is supported. Per motor, a maximum continuous current of 5 A to 10 A is possible. The standard configuration includes an incremental encoder interface as well as 4 digital in- and outputs (24 V) each, which can be used according to the application requirements.

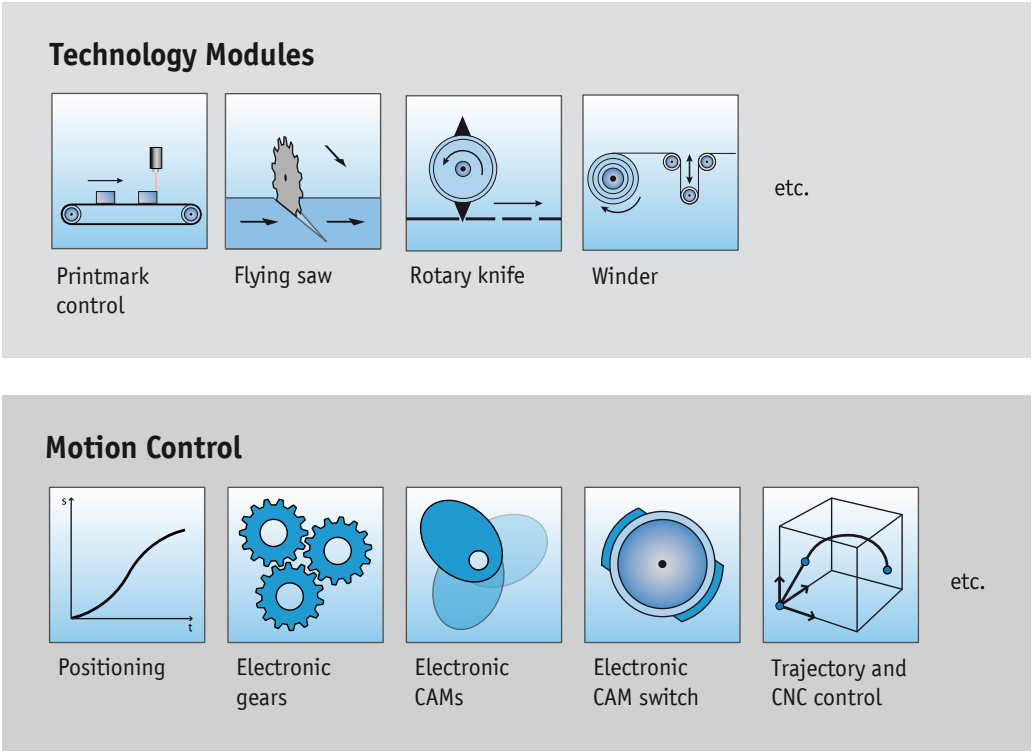
Predefined modules simplify the motion design

Motion Under Control

The integration of the initial start-up and parameterization software into the object oriented engineering tool LASAL simplifies programming/ parameterization. No additional software is required.

The seamless integration of PLC and motion control results in improved synchronization of process and motion operations in the machine. Motion control and technology functions form the core. LASAL MOTION offers all the functionality needed for a production machine, from simple 1-axis to complex multi-axis applications. The spectrum ranges from electronic CAMs and printmark control over various positioning modes, synchronous speed and electronic CAM switches to CNC and trajectory controls with transformations for robot kinematics and CNC applications.

In addition to the extensive basic functions, machine oriented technology modules are available such as "flying saws", "rotary knives", or “winding“. For the user, implementing frequently occurring motion control tasks is child's play.



Motion control and technology modules ensure the highest possible engineering efficiency.

Simple and integrated

Safety

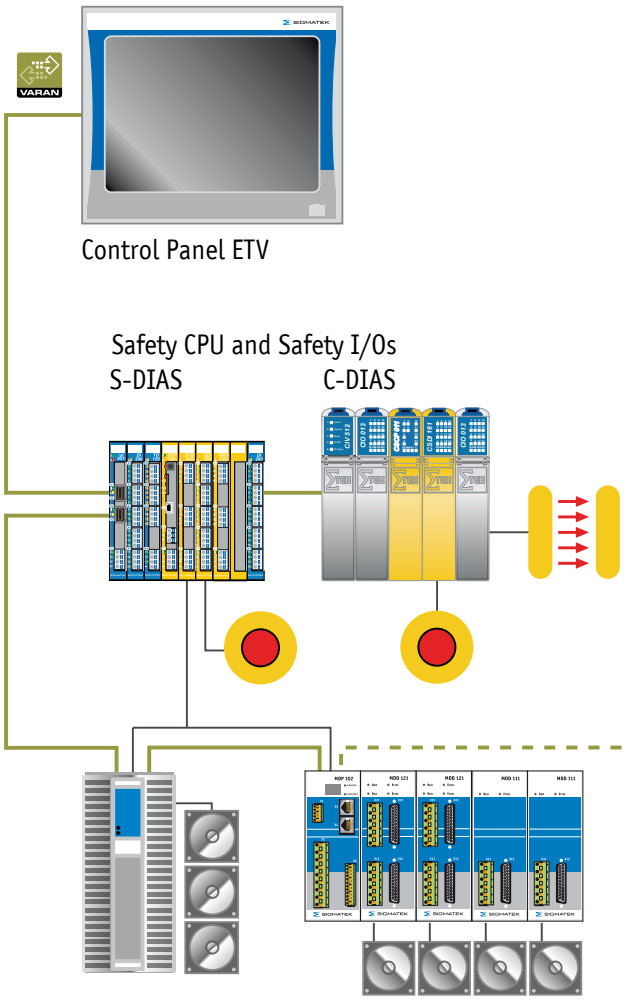
Functional Safety is completely integrated into the control system from SIGMATEK. Two component series are available: S-DIAS and C-DIAS. All Safety components can be combined as desired with standard modules of their series. Safety functions are also implemented in the drives. The entire system meets the IEC 61508 / SIL3 / PL e Norm.

The fully integrated Safety systems from SIGMATEK allow the simple implementation of ISO 13849-1 requirements. Easy installation and comfortable programming contribute to the increased engineering efficiency of your machine.

Functional Safety

Through a modular and decentralized configuration, the Safety components or systems can be flexibly integrated into the SIGMATEK architecture. Safety and non-Safety components can be combined as needed. All topologies and configuration variants are possible. This modularity ensures an individual customization to any need. Both series are therefore flexible and suited for use in various industries. Existing systems can also be easily expanded with Safety functions.

The basis of SIGMATEK Safety solutions is corresponding hardware components that continually monitor themselves to detect possible errors and if needed, bring the machine into a Safe status. Sufficient protection of operating personnel is therefore guaranteed without affecting machine performance.



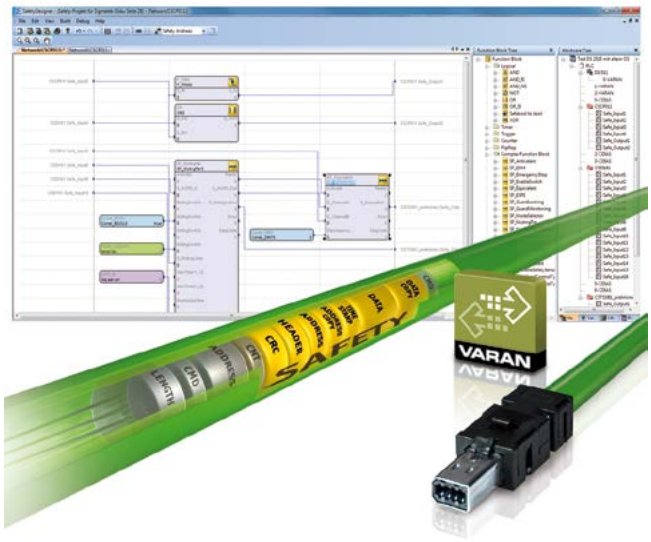
Control Panel ETV

Servo drives with integrated Safety

One Bus for Standard and Safety

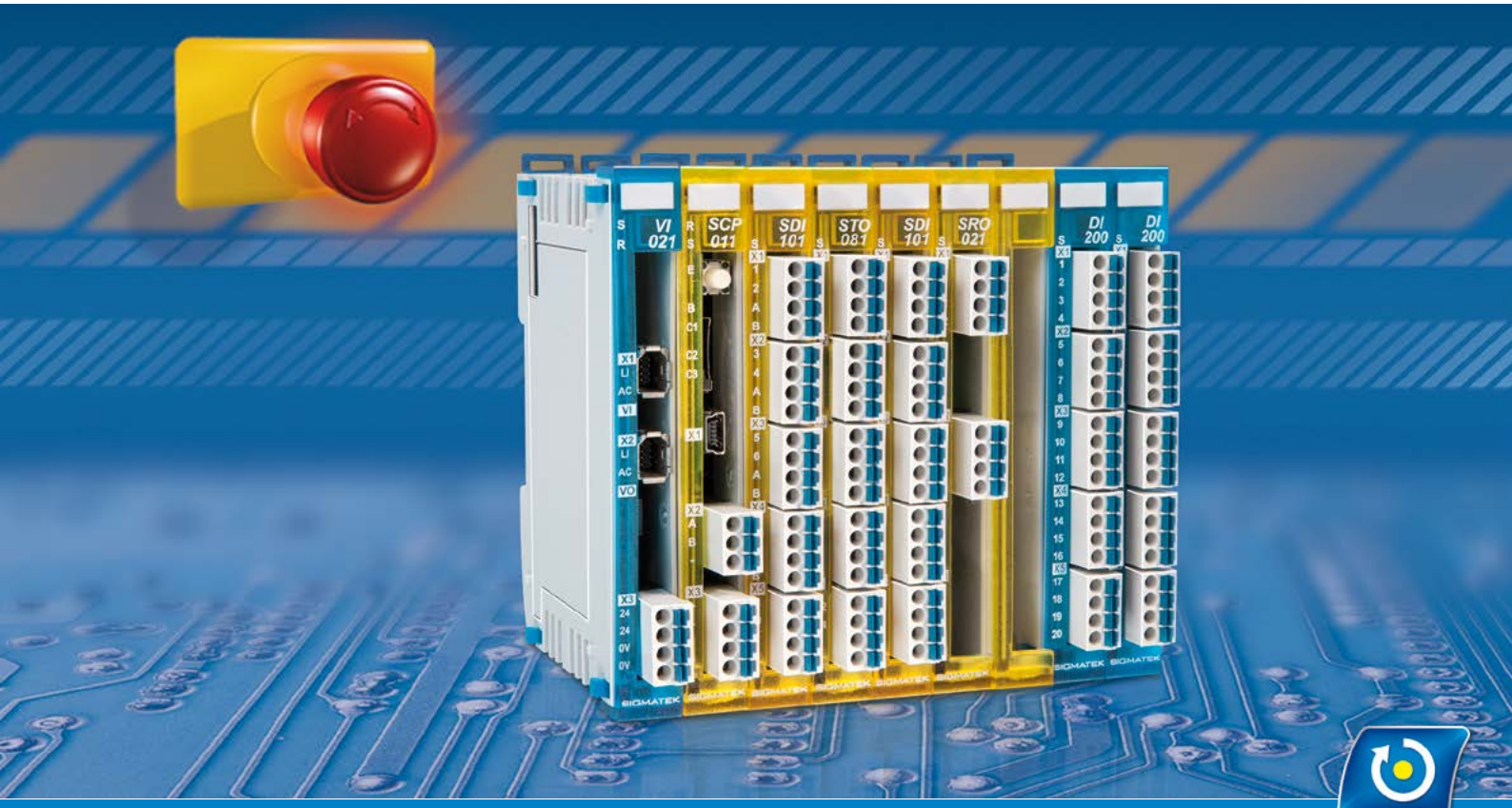
No additional wiring is needed for communication. Standard as well as Safety-data can be exchanged over the Ethernet-based hard real-time VARAN bus. The S-DIAS Safety system or C-DIAS Safety modules can be distributed in the VARAN network as desired.

For communication with the Safety components, the "Black Channel" principle is used, whereby the bus does not assume any Safety-relevant tasks but rather serves as a 1-channel exchange medium, which does not have to be included in the Safety considerations. The Safety data are integrated into the VARAN telegram and transmitted redundantly.



Highlights

- **Simple:** fully integrated Safety simplifies engineering
- **Integrated:** one bus system for standard and Safety data
- **Comfortable:** predefined Safety function blocks



Modular Safety Hardware

The S-DIAS and C-DIAS modules convince with the same compactness as the standard modules of their series. The easy handling and hard real-time capability were transferred to the Safety system.

Through their 2-channel principle, all hardware components of the Safety systems have a safe core. The Safety CPU stores the application and monitors or controls the Safety I/Os. Various Safety I/O modules with cross circuit detection are available. With the modular S-DIAS and C-DIAS Safety systems, safety-relevant requirements can be flexibly implemented. S-DIAS Safety systems can also be used as a stand-alone solution.

Safe Drive Technology

Highly dynamic motion control applications used in Safety technology require fast reaction times to prevent uncontrolled movements in case of an error.

In the various DIAS Drive component series, important Safety functions such as Safe Stop 1 (SS1) or Safe Torque Off (STO) are integrated. Additional functions such as Safe Operating Stop (SOS), Safety Limited Speed (SLS) or Safe Direction (SDI) are in development.

Integrate Safety Easily and Seamlessly

With the LASAL SAFETY Designer, the user is provided with a comfortable tool for programming and configuration.

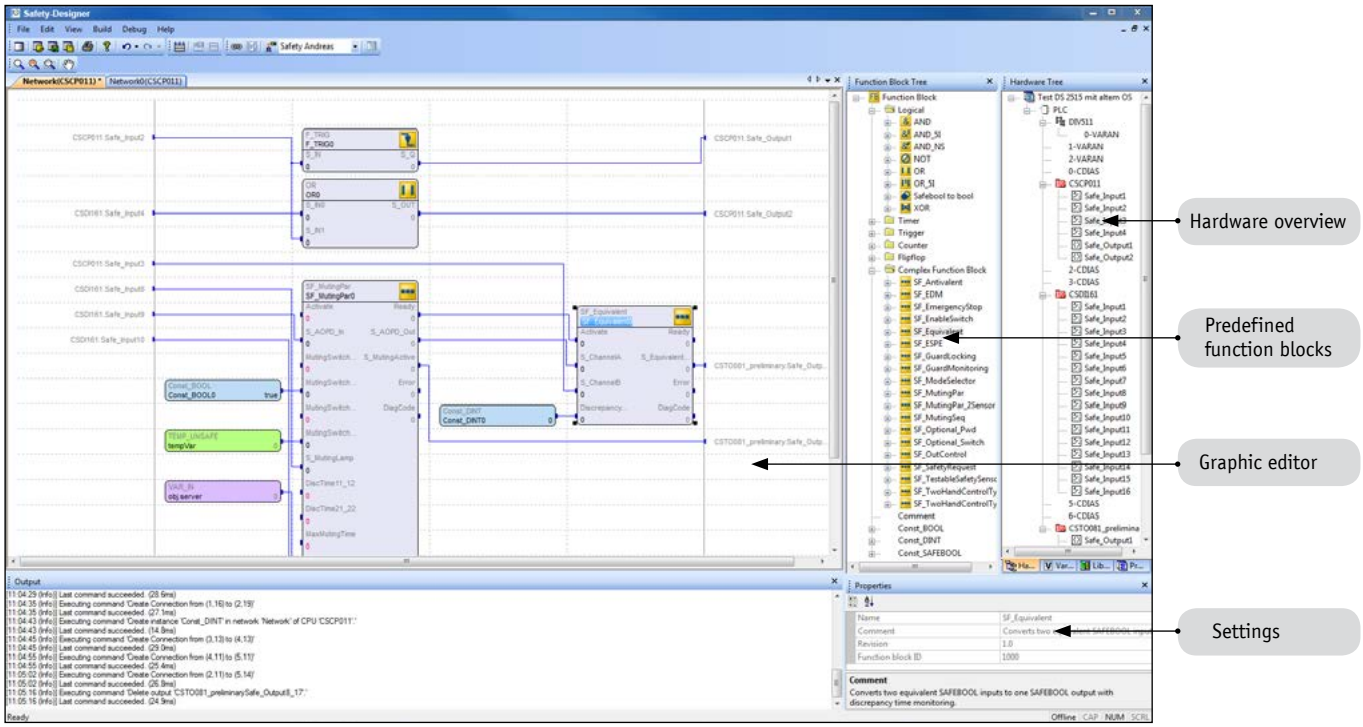
Based on a function library, the user can easily create the logic connections for Safety-related processes. Certified standard function blocks (logic connections, timers, counters, etc.) and Safety function blocks based on the PLCopen standard, such as Emergency Stop, Two Hand Control or Guard Locking are available.

The function blocks and the I/Os can be freely placed in the integrated graphic editor using Drag&Drop and linked to the non-safe variables in the PLC.

Downloading, Online-Monitoring and Debugging are performed over the online interface in LASAL. Per application, several Safety controllers can be inserted.

A special feature of the SIGMATEK Safety system is that independent projects can exchange Safety-relevant information. In addition, individual I/O modules can be defined as optional so that machine components can be removed without having to change the Safety program.

The simple operation and clearly organized display reduce programming and troubleshooting and especially simplifies validation.



Networked in hard real time

VARAN Bus

Flexible and modular machine structures are in demand. The perfect networking of components thereby plays an important role. Integrated, hard real-time communication is a key factor in industrial automation technology. SIGMATEK focuses on VARAN.

The Ethernet-technology based VARAN bus system meets all the requirements for a modern industry network. VARAN is simple, safe, fast, hard real-time capable and easy to implement. With VARAN, the high demands of drive technology can also be met. Through the high data transfer rate and bandwidth of the real-time Ethernet communication, it is possible to activate several drives in the shortest cycles.

Precision in Hard Real Time

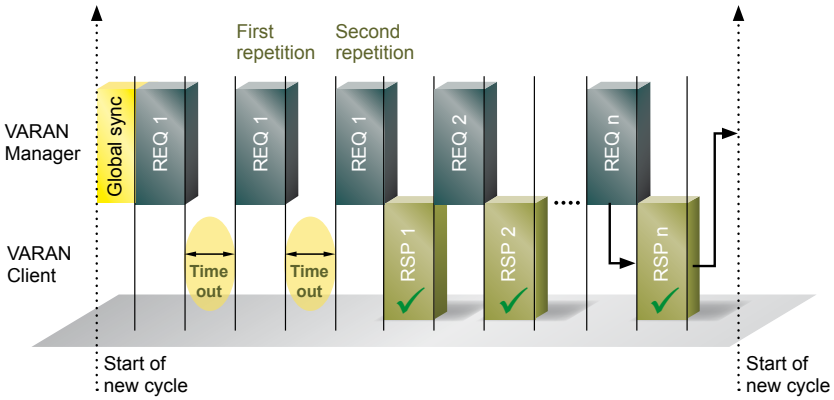
The VARAN bus is based on standard Ethernet physics. The complete protocol is implemented in the hardware with an FPGA. Through the use of the Manager/Client principle, collisions on the bus are avoided. The bus participants are synchronized at the start of each bus cycle. Data is exchanged in hard real time with guaranteed determinism at cycle times up to 100 µs and jitter under 100 ns. To perfectly integrate available networks, TCP/IP packets are tunneled.

Performance data		
Bus cycle times	Up to 100 µs	
Jitter	< 100 ns	
Isochronous access time	1-byte r/w	2.18 µs
	16-byte r/w (1 drive)	5.05µs
Asynchronous direct access	128-byte r/w	< 25 µs

Data Security

The VARAN bus is especially suited for applications that require a high degree of data exchange security. In the harsh industrial environment of a machine with countless electronic components, electromagnetic noise exists, which inevitably affects the bus system. In the VARAN protocol, measures are

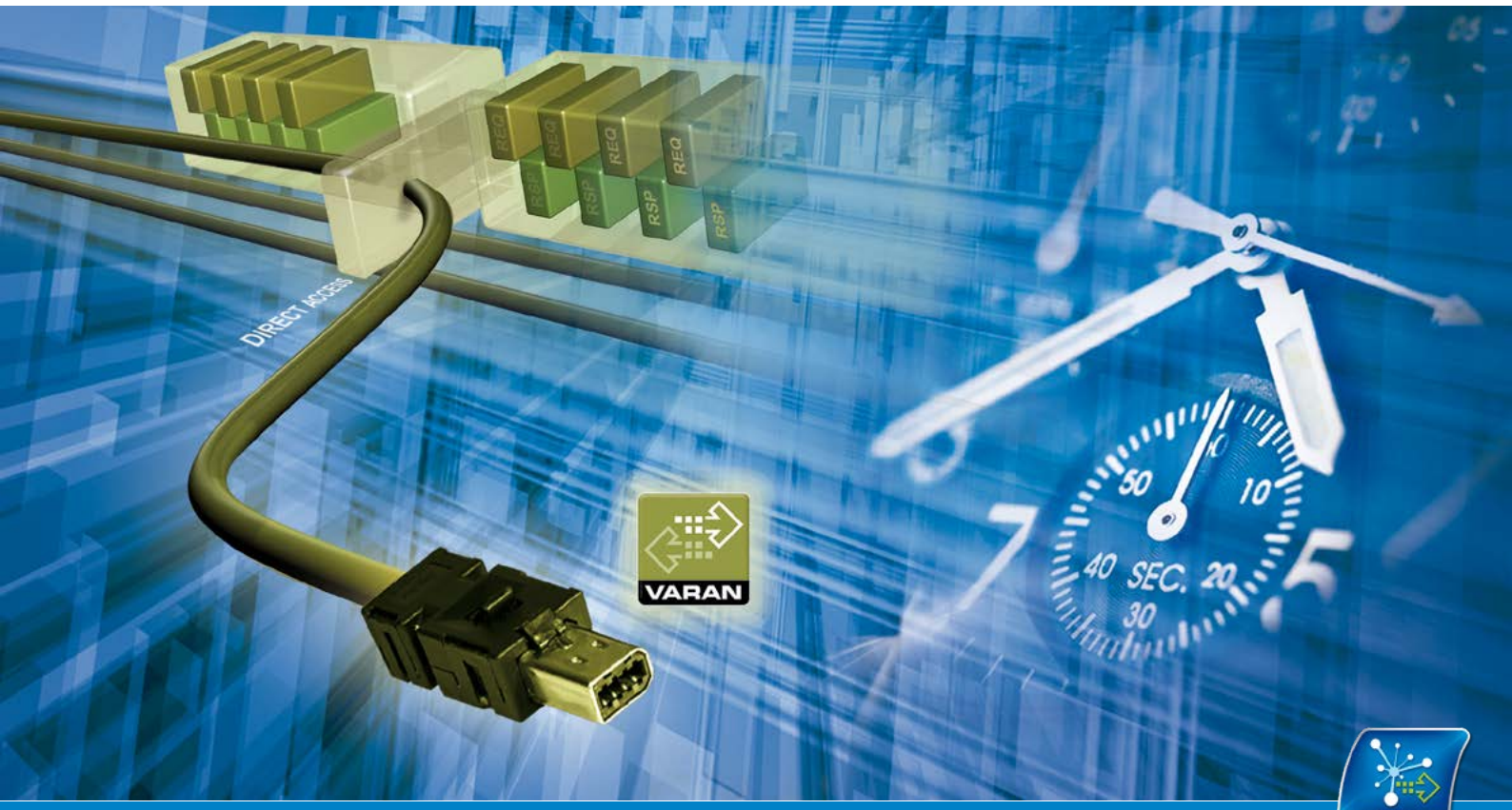
implemented to improve the error tolerance. A significant advantage of VARAN, in comparison with other real-time bus systems, is the very small packet size. Instead of long Ethernet frames, the packet lengths used in the VARAN bus are a maximum payload of 128 bytes. Through the use of short packets, the probability of communication errors are minimized with VARAN. With individual frames, each bus participant is activated individually by the VARAN-Manager. All messages are confirmed by the client components in the same bus cycle. Communication errors are detected immediately and unacknowledged messages can be repeated during the same bus cycle. At the end of the bus cycle, the consistency of all process data is therefore guaranteed. In addition, VARAN offers the unique possibility for asynchronous direct access.



Guaranteed data consistency at the end of each bus cycle: unacknowledged telegrams are repeated during the same cycle.

Highlights

- **Integrated:** one network for the entire machine
- **Hard real time:** cycle times up to 100 µs
- **Safe:** error correction in the same bus cycle
- **Flexible:** different network topologies
- **Open:** VNO guarantees manufacturer-independence

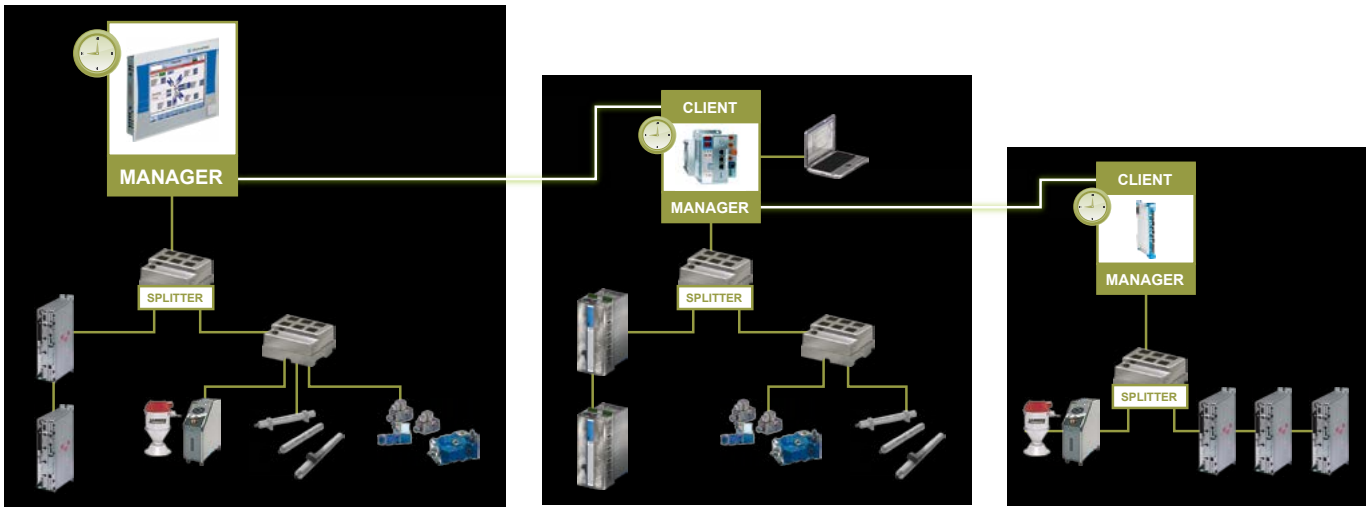


Flexible Network Topologies

The VARAN bus organizes itself during the start-up phase. The assignment of network components is automatic. Complex bus topologies can be created easily and flexibly; especially with modular machine concepts.

Line, star and tree structures can be combined as desired. This open architecture provides the user with a high degree of flexibility – also with later expansions of a machine or system. On a higher level of abstraction, the production lines can be divided into individual machine modules, which are each automated with a separate control. The various controls in a production line can be automatically synchronized using the VARAN Multi-Manager structure. The data is exchanged between the machine modules, as with every network segment, in hard real time with minimal jitter. Different cycle times between the network segments can also be realized.

Thanks to the hot-plug capability, entire machine modules for example, can later be added or removed from the VARAN network even during operation.

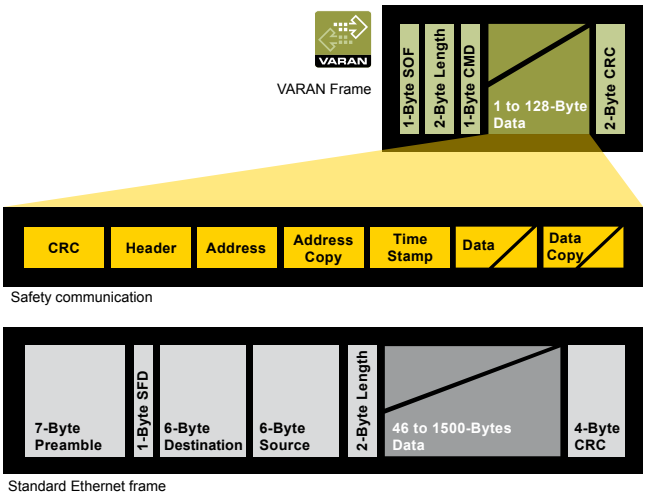


Synchronization of several VARAN networks using the Multi-Manager principle

VARAN Speaks Safety

Through the use of one communication system for Safety and standard automation, the separate wiring of safety components is no longer necessary. The real-time Ethernet bus VARAN is suited for automation systems that must meet SIL3 standards according to IEC 61508 or Performance Level PL e standards according to ISO 13849. The Safety-relevant and standard data are exchanged in the same bus system, and this without affecting the data transfer rate and cycle times.

The Safety protocol is embedded in the standard VARAN frame. In the VARAN Safety telegram, data is coded twice and saved through a checksum (CRC) which includes a time stamp. Faulty data is therefore clearly identified during communication.



Connectivity

Naturally, the SIGMATEK automation world can also communicate with third party systems. Ethernet TCP/IP, CAN, Profibus etc. are integrated into numerous components. Additionally, we offer VARAN-Gateways, which enable the connection to other industrial Ethernet systems such as Profinet. These interfaces ensure the openness to the outside world and therewith the interoperability with components from other manufacturers.

Open Standard

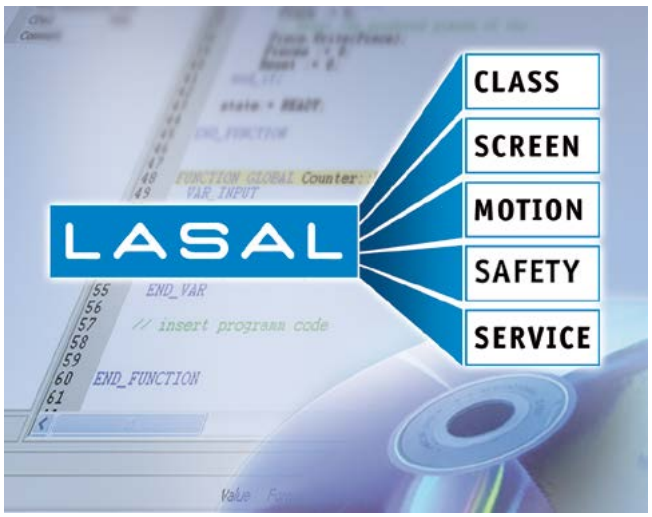
VARAN is an open standard and control-independent. The rights for the real-time Ethernet technology are held by an independent organization, the VARAN BUS USER ORGANIZATION (VNO). All members have unlimited user rights to the VARAN technology.

Efficiency in the development of machines

Engineering Tool LASAL

The modern all-in-one engineering tool LASAL allows the integrated and flexible realization of machine applications. Programming is greatly simplified and the development times, as well as the time-to-market cycles are reduced significantly.

Engineering has become a decisive factor in industrial automation, as machines and systems become increasingly complex and must be flexibly adaptable to specific applications. The use of a modern complete tool for all project phases offers an enormous savings potential.



All-In-One

LASAL provides all the functions for solving automation tasks in one tool: PLC programming, visualization, motion control, Safety, service, diagnostics and remote maintenance.

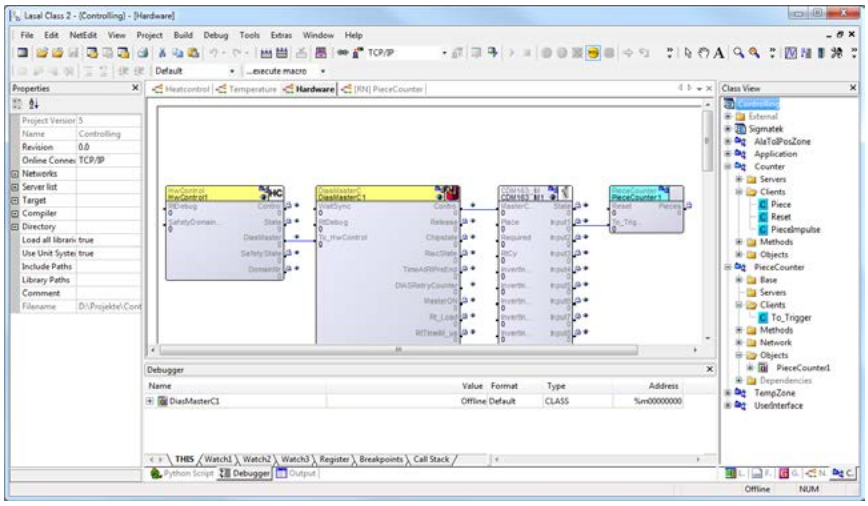
Object oriented programming ensures the machine manufacturer the highest possible flexibility, since the object oriented construction of the software allows quick reaction to the customer-specific needs. The individual objects can be combined like a modular tool box system.

Object Oriented

LASAL is a highly modern engineering tool: In 2000, SIGMATEK was the first to integrate object oriented programming with graphic representation and Client/Server communication into automation technology. With object orientation, LASAL set a new standard for modularity and reusablity. Through the inheritance of class properties, a structure of program components in hierarchical levels is possible. The clear modular software structures simplify the development of applications. Through the modular structure, previously created application components can be changed or reused easily.

Graphic Representation

Through the graphic representation, the clarity of the software structures is improved. The user can therefore get a quick overview of the project structure and the relationship between the individual modules is clarified. Complex applications can also be clearly and transparently displayed. This simplifies use and helps to shorten the engineering and maintenance times.



The Future in Sight

LASAL can be used with the entire SIGMATEK product palette, such as CPUs, terminals and industrial PCs. The hardware platform can be changed without having to adapt the software.

Highlights

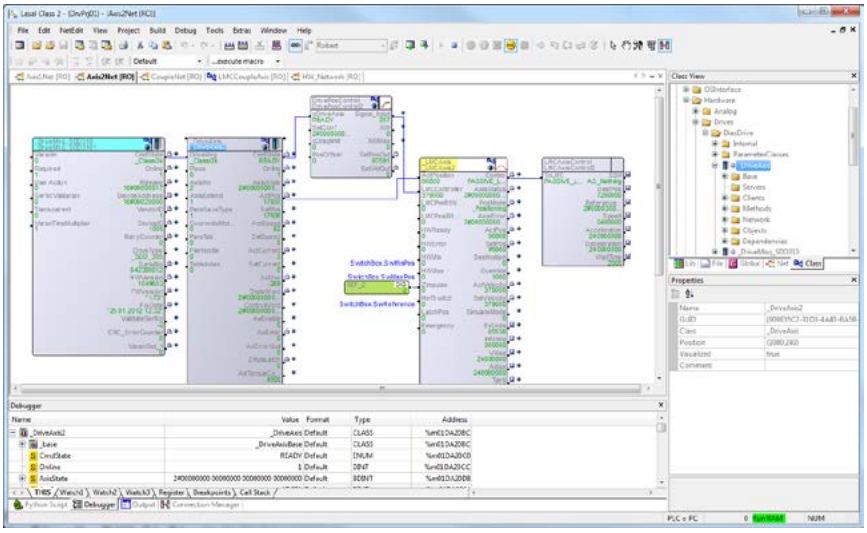
- **Integrated:** ONE engineering tool for all phases of the development process
- **Efficient and clear:** through object oriented programming, the highest modularity and reusability
- **Comfortable:** several integrated tools

LASAL CLASS Object Oriented Programming

With LASAL CLASS, object oriented programming of the control is possible. Behind the program module (object), is a class containing the program code and the corresponding data elements. Each class can therefore assume a specific task, such as controlling a drive.

The actual program code is written in the conventional IEC 61131-3 languages such as structured text, ladder logic or in C. This is an essential acceptance factor, since the methods of object oriented programming are available as an integrated extension of the trusted and proven languages.

Effective and comfortable tools support the user in programming and trouble shooting: Online debugger, real-time oscilloscope, Trace view of CPU tasks and the script language Python for the automatic generation of machine software.



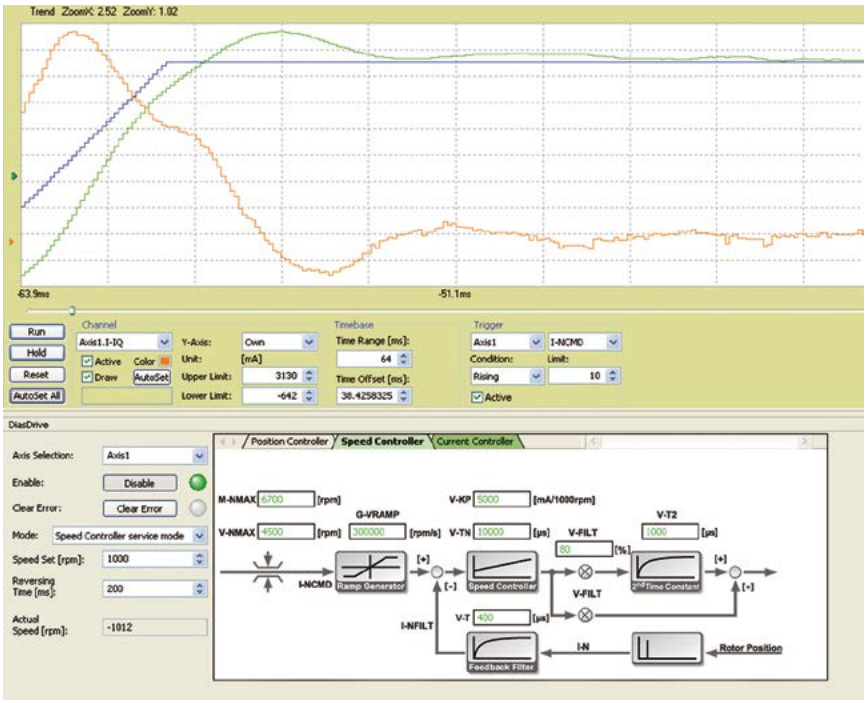
Graphic representation of objects

LASAL SCREEN Clear Visualization

LASAL SCREEN is an HMI tool for efficiently creating the visualization on all graphic terminals and Industrial PCs. Predefined graphic objects are available. A visualization is created using parameters; labor-intense programming is eliminated. A large graphic pool, functions such as alarm and event management, trend display, recipe management and numerous standard functions for drawing, alignment, conversion, etc. are included. Project components, such as pictures for example, can be simply exported or imported. Online language and unit conversion is also integrated.

LASAL MOTION Flexible Motion Designs

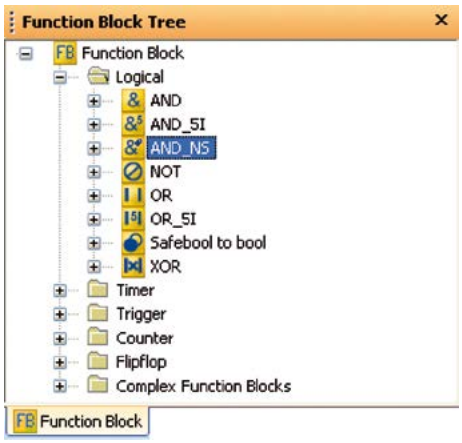
LASAL MOTION simplifies all motion control tasks. With just one tool, complex axis control and regulating tasks as well as motion programming can be implemented comfortably and linked to the control program. Numerous servo drives from SIGMATEK as well as other manufacturers are already provided as objects for easy use. Servo movements can be performed without programming by simply inputting data or instructions. The motion control functions contained in the library open a broad spectrum.



Setting controller parameters and oscilloscope display in one screen is possible; clarity is therefore guaranteed.

LASAL SAFETY Integrate Safety

The seamless integration of the Safety Designer into the engineering toolkit LASAL simplifies programming and configuration of the Safety controller for the user. Logic connections and I/O configurations can be created comfortably. Predefined function blocks make Safety programming and maintenance easier.



LASAL SERVICE First Class Service Tools

The all-in-one engineering tool is completed with a comprehensive service package. Remote maintenance, software updates and data exchange are comfortably realized: Webserver, OPC server, Remote Manager, LARS simulation tool, etc.

Customer-oriented and reliable

Support and Service

We concentrate on your needs and desires. In addition to our many years of experience in machine building and automation expertise, we bring the concept of service into the partnership - for the entire life cycle of your machine.

Engineering Support

Together with you, we develop your project to a successful conclusion - of course on-site as well. With our engineers and technicians, your machine is in the best hands: Whether finding solutions, project development, engineering, initial start-up or service. Our goal is to create added value in all phases of the project.

Support Hotline

When you need a fast answer to a technical question, our support is there for you around the clock. Instead of an answering machine, you will reach a competent contact person who will personally address your concerns.

Practice-Oriented Training

Regardless of whether you need a first glimpse into control technology or are interested in specific topics, in our practice-oriented training you acquire the necessary technical knowledge from the source. The modularly designed seminars are customized to various practical requirements.

In Use Worldwide

Your machines should run like clockwork and produce with maximum performance. Regardless of where you deliver your machine, we are there when you need us. Whether for initial start-up, on-site service support or in case of an emergency - we go everywhere - and fast.

Fast Spare Part Delivery

Spare parts and repairs are always urgent. Therefore it is important to us, even after several years, to be able to deliver the correct spare parts as fast as possible. Naturally, our high vertical range of manufacturing comes into play.

Our Promise - Your Advantage

We help to increase the productivity of your machine

Higher output and better quality ⁘ Improved machine processes ⁘ Flexibility through automatic product changeover ⁘ Reduction of idle times

We reduce your engineering time

Reliable consultation during the entire product life cycle ⁘ Improved engineering processes with an integrated tool ⁘ Reusability of machine modules ⁘ Training and coaching

We bring ideas for the machine concepts of tomorrow

Fast implementation of technology trends ⁘ Creative ideas from our experienced branch experts ⁘ Long-term, trusting partnerships as the basis for innovations

We make your machine more economic in all areas

Savings through an integral view of a machine's life cycle ⁘ Cost-optimized and scalable hardware components ⁘ High performance engineering and service tools

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