

be in motion

be in motion

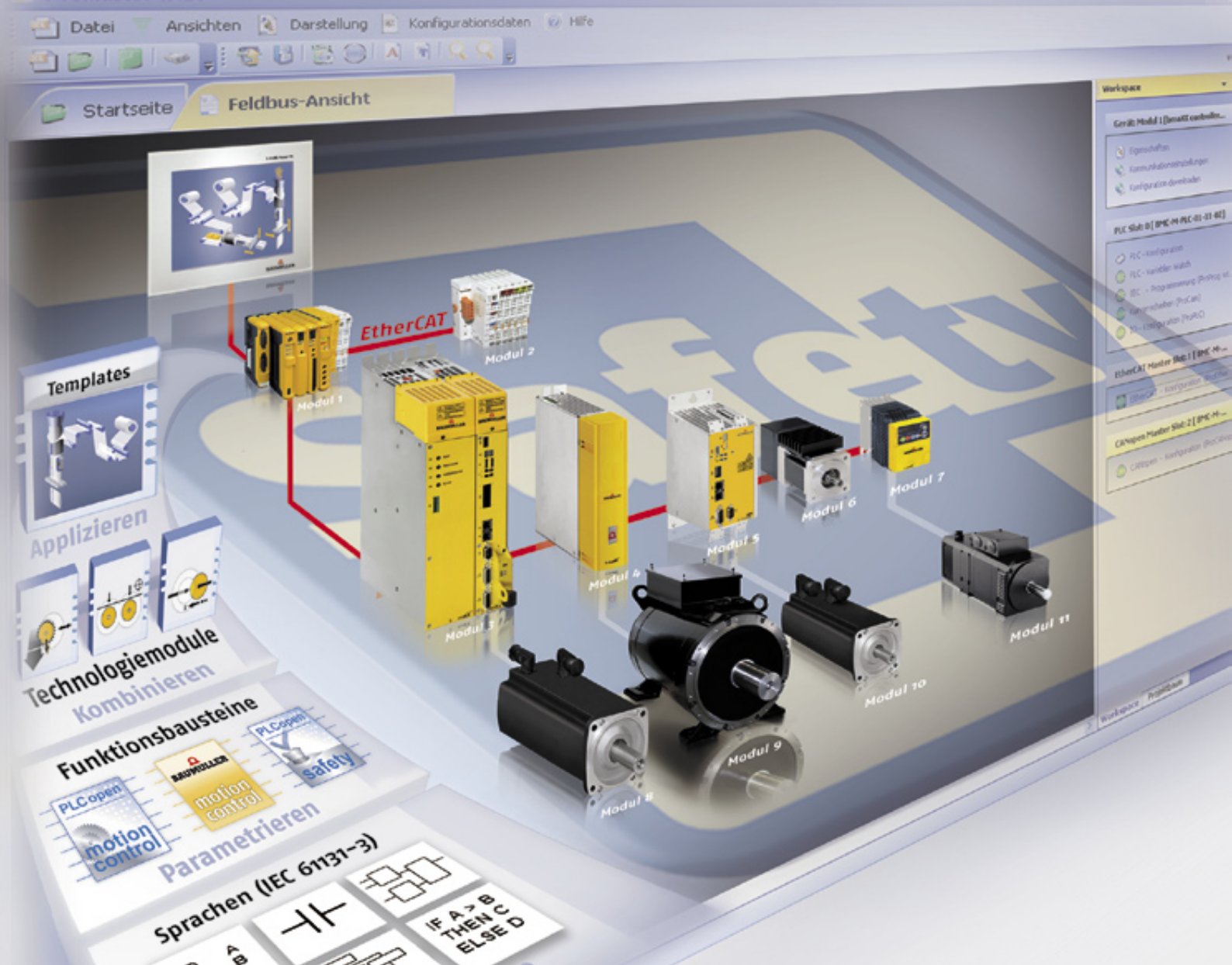
Concepts Safety engineering ProMaster

Automation

7000 8000 9000 10000

90 100 110 120

Real-time Ethernet PLCs I/O HMI



Automation concepts

Topologies

Engineering framework ProMaster

Real-time Ethernet and field bus communication

Control technology b maXX-drivePLC

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Our automation solutions for your machines

Our interest is always in the successful operation of the overall system, and, naturally, its optimization through our products and services. For this, we rely on Baumüller research. We develop modern solutions for automation and drive technology there. Our solutions are implemented successfully in every branch of mechanical engineering, from special machines to mass-produced ones. We design and supply complete automation systems, from control desks to the machine controller and software solutions to the electrical drive system.

Supporting our customers from commissioning of the system and over the course of the lifetime of the product is part of our company philosophy. As part of our comprehensive service spectrum, engineering, support and service play a decisive role.

Technical competency, innovation, flexibility and total customer orientation are the characteristics of our company philosophy. This is also reflected in our motto:

be in motion.

Information, projects and documentation are updated on a daily basis and can be found at:

www.baumueller.com



Control technology
b maXX-controllerPLC

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Control technology
b maXX PCC

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Local and remote
I/O modules

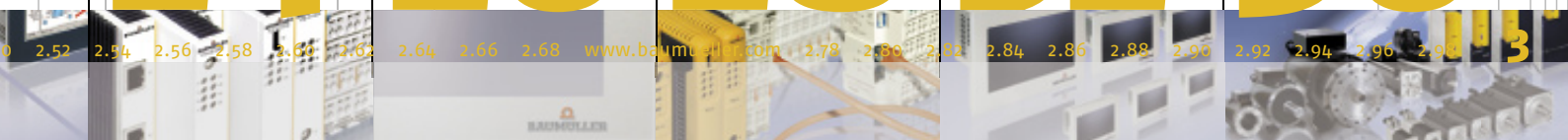
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Operating
and displaying HMI

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Converters
Motors
Vibration compensation

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61131-3

61131-1 61131-2

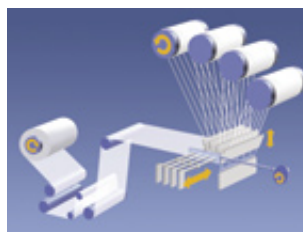
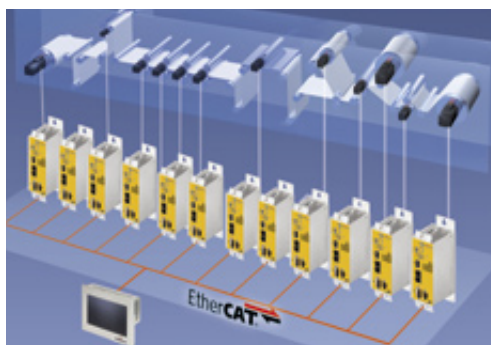
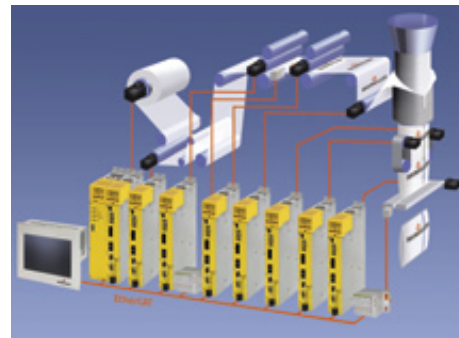
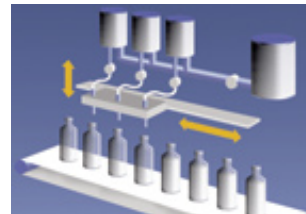
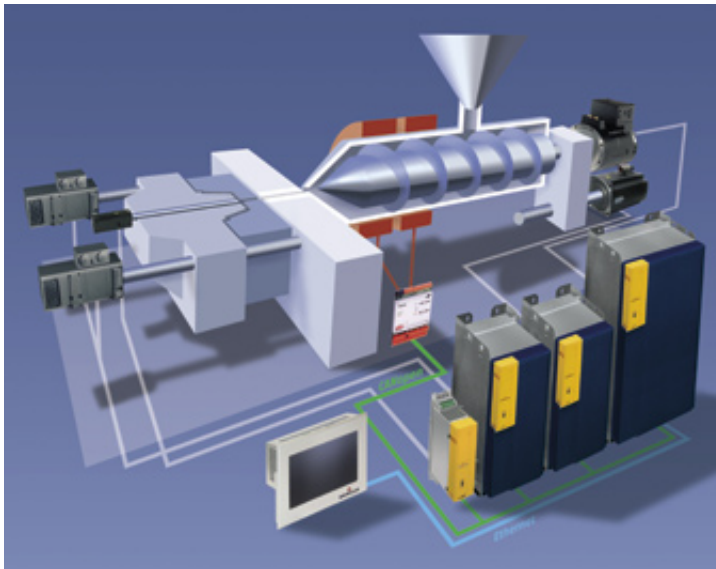
In Standard 61131, the International Electrotechnical Commission specifies five programming languages among other things. Functions and function blocks written in one language can be used in all other languages. Baumüller programs in all languages of IEC 61131 depending on the requirements and customer wishes.

Our control concepts for your automation

Modern machines and systems are increasingly being built in a flexible way, whereby centralized, modular decentralized and hybrid automation concepts are available. The increasing demand for higher productivity and higher availability results in an increasing complexity of machines and systems.

Baumüller has set its sights on reducing the growing complexity in the software part of your machines. Our comprehensive ProMaster Engineering Framework with integrated safety engineering and complexity-reducing Motion Control technology represents the ideal basis for this.

IEC 61131-3

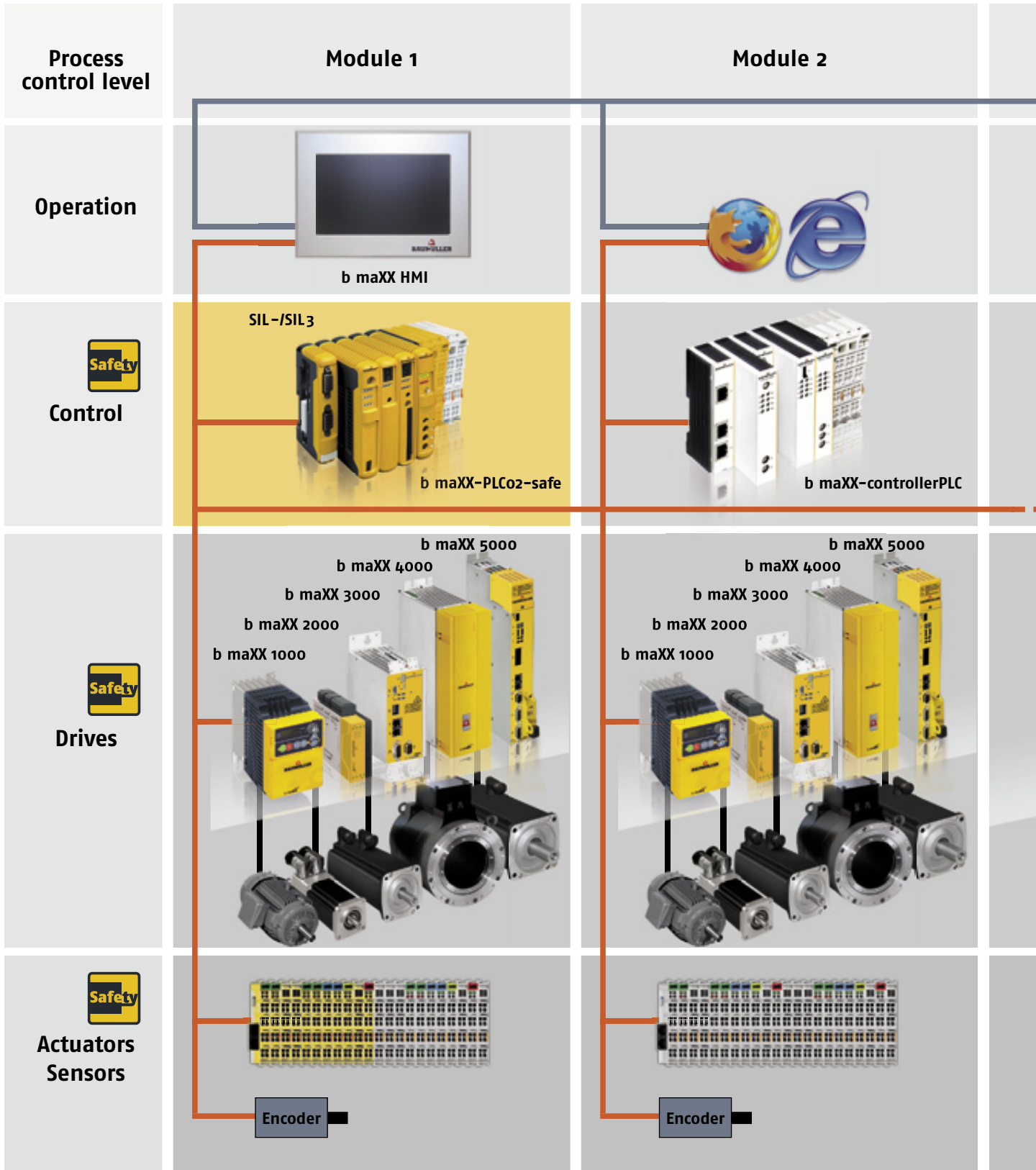


Your benefit

- ⊙ Comprehensive engineering
- ⊙ Comprehensive safety
- ⊙ Flexible topologies
- ⊙ Extensive libraries
- ⊙ Reduction of complexity
- ⊙ Shorter time to market
- ⊙ Investment security

61131-1 61131-2 61131-3

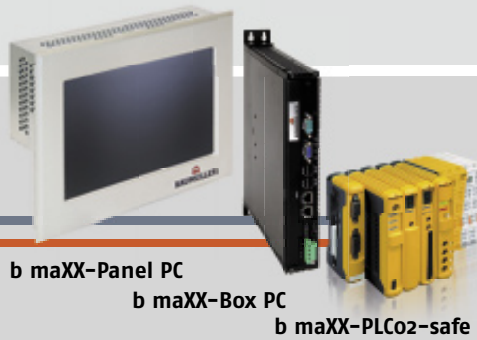
Flexible topologies



Ethernet

Module n

Real-time-communication
(real-time Ethernet)



Consistently scalable visualization

The b maXX HMI includes a wide range of different operating devices. The slim design and the large functional variety provide you with all the options you need to make the operation of your machine more efficient. From the smallest HMI to complex applications – operating, observing, archiving, communication – all in one integrated visualization environment.

Safety engineering

Safety control pursuant to EN ISO IEC 61508 covers both the standard and the safety functions up to SIL 3. Drive-integrated, functional safety pursuant to IEC 61800-5-2.

PC-based technology

Greatest performance class on the control, field and communication level for highly synchronized control and visualization tasks in a device.

Safe real-time Ethernet technology

A standardized, high-performance and comprehensive real-time Ethernet system that also integrates safety engineering up to the drive with the safety protocol FSoE.

Servo technology and frequency converters

In power classes from <1 kW to >315 kW, as mono units or as compact rack technology.

Synchronous and asynchronous technology

From highly dynamic servo motors to powerful torque motors with over 13,500 Nm.

Field level

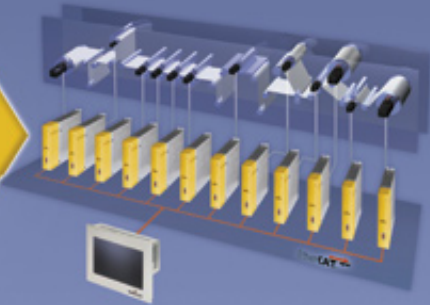
I/O components and encoders

* currently in preparation



Configuration management
XML

- Tools
- Reusability
- Knowledge



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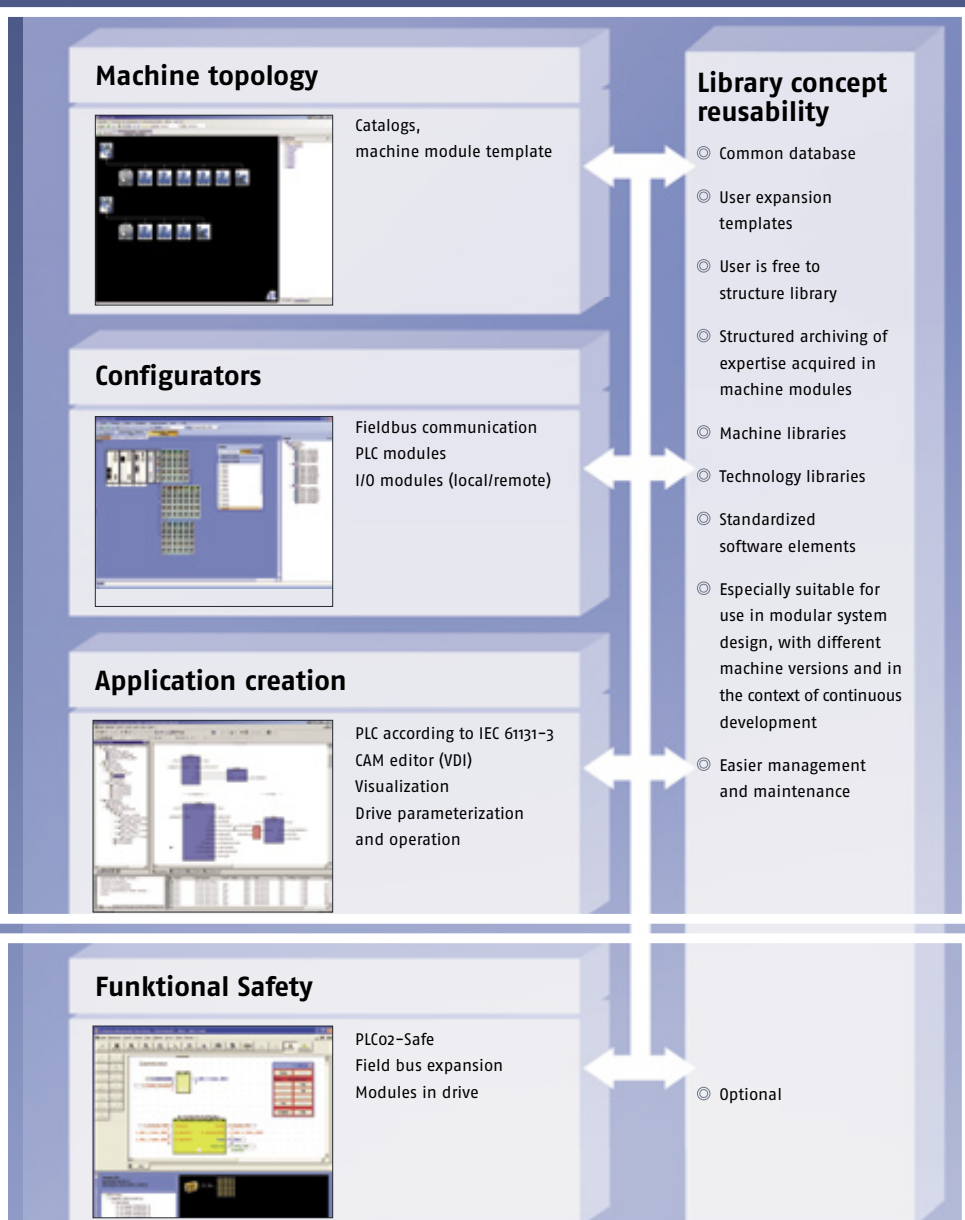
Your requirements

The increasing complexity of machines and systems also increases the requirements on automation. Larger data volumes need to be processed. In addition to functional aspects and changing customer requirements, regional regulations such as the Machine Directive must be taken into account.

The requirements for flexibility, minimum complexity and simultaneous reduction of the engineering effort can only be handled with an integrated approach and systematic procedures. This is the basis for innovative solutions for modern automation tasks.

ProMaster

Standard



Safety

Engineering with ProMaster

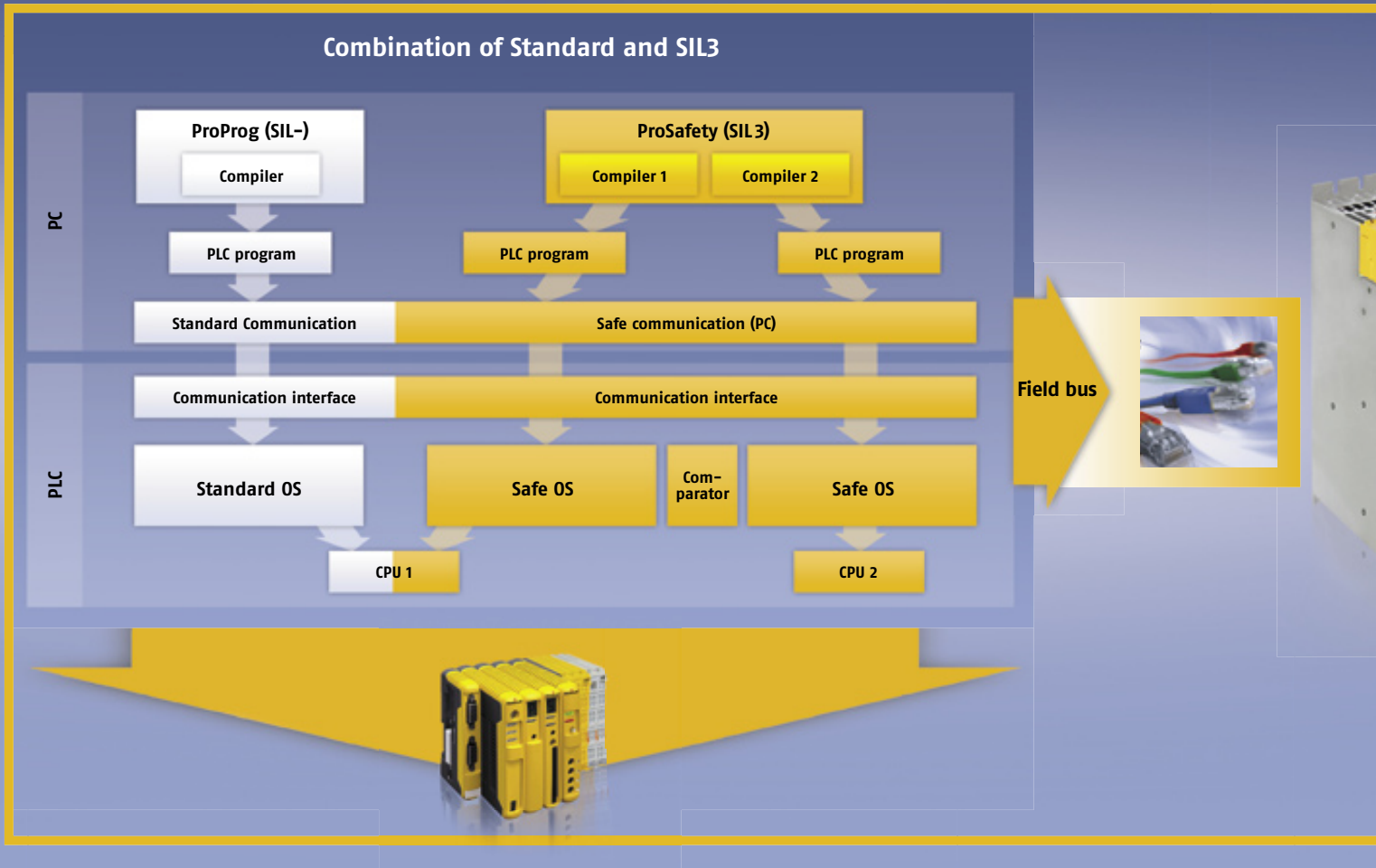
Our solution

The innovative engineering framework includes all the disciplines of an automation task: from drive design to parameterization, from programming of controllers and field bus parameterization to visualization. This applies to the entire life cycle, from planning and initial operation to maintenance.

Your benefit

An engineering framework helps you design more efficiently and systematically reduces effort, in spite of the increasing complexity of machines and systems. Defined interfaces, modular machine architectures and optional extensions lead to more efficient and flexibly useable automation solutions.

An engineering framework for all automation tasks makes processes more efficient, allows for fast production of systems, improves product quality, reduces fault probabilities and thus increases the productivity of the machine manufacturer as well as the machine operator.



ProSafety – Safety with ProMaster

The ProSafety programming system, together with its real-time environment, was developed according to the IEC 61508 requirements and covers the entire range of safety functions up to Safety Integrity Level 3 (SIL 3). A machine can be operated safely with little expenditure thanks to ProSafety. A wizard guides the user to a safe control program in just a few steps.

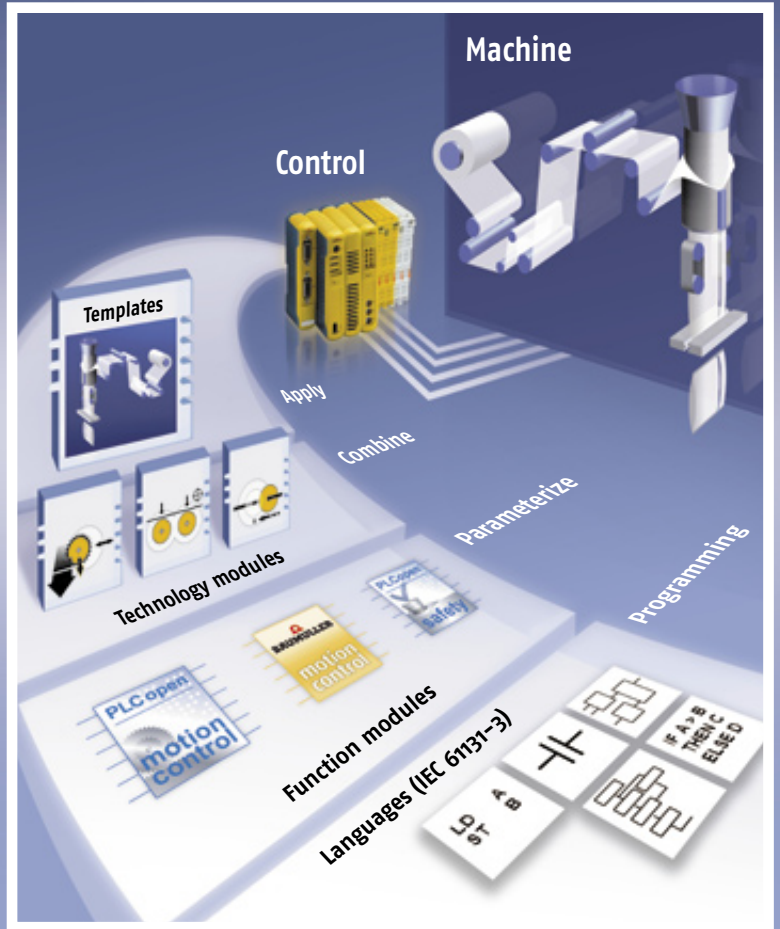
Your benefit

- ⊙ Full integration of the safety programming and configuration with a uniform project database in ProMaster
- ⊙ Consistent and transparent integration of the safety technology in the ProMaster engineering framework. Using ProSafety guarantees complete, safe configuration
- ⊙ Combination of standard and SIL 3 programming on a controller fully possible and without any repercussions
- ⊙ PLCopen Safety function modules are available as library elements for easy safety programming
- ⊙ Configuration of safe devices, such as drives, sensors, relays and terminals
- ⊙ In conjunction with our safe drives and bus terminals, safe systems can be implemented pursuant to IEC 61508 (up to SIL 3) and EN 13849 (up to PL e)

ProDrive

ProSafe Para

Libraries



Our library concept

Our libraries are comprehensive, optimally matched to your automation tasks and build upon one another. Combining different modules is made easier thanks to interfaces. Your acquired expertise can be transferred to your own libraries, managed there and used again anytime. Thanks to the use of international standards (e.g. PLCopen Motion Control) and technology-specific enhancements from Baumüller, maximum investment security is guaranteed.

Your benefit

- ⊙ Investment security
- ⊙ Encapsulation of intellectual property through the use of customer-specific function modules/libraries
- ⊙ Reduced complexity
- ⊙ Quick and easy application thanks to the use of technology modules
- ⊙ Maintainable, trainable and transparent, since the same program and axis modules structures are always used
- ⊙ Templates for program structure and axis modules are used

The Motion Control library

The planning of Single Axis and Multi Axis functionality in accordance with 'PLCopen Motion Control' is only carried out using the relevant function module libraries from a technological point of view. The standard IEC 61131 programming languages are used. The system functionality that is required for motion management, field bus communication and drives is integrated in the operating system of the Baumüller b maXX automation system using a communication and motion manager.

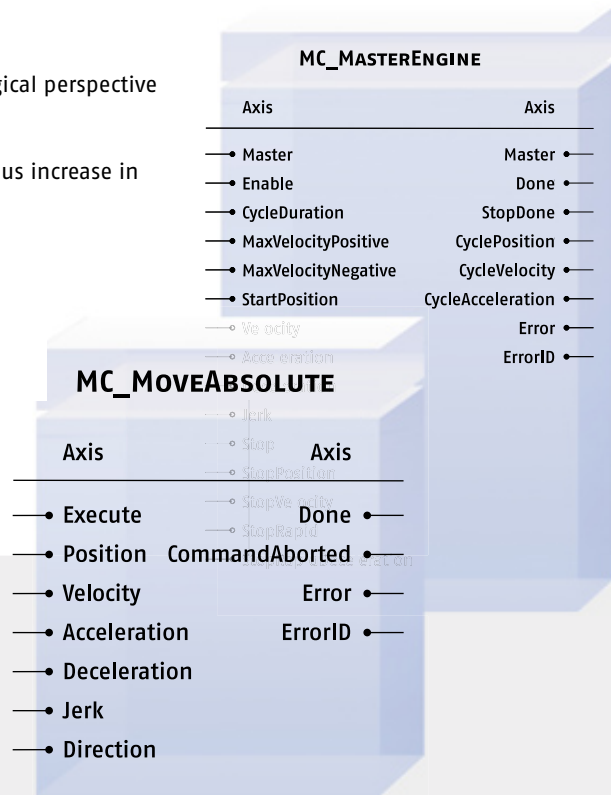
Motion Control Single Axis



Module	Task
MC_ErrorInfo	Output of the fault message in plain language
MC_Home	Start reference traversal
MC_HomeInit_HomeSwitch	Initialization of reference traversal at ref. switch
MC_HomeInit_LimitSwitch	Initialization of reference traversal at end switch
MC_HomeInit_SetPosition	Set initialization of reference traversal position
MC_HomeInit_ZeroPulse	Initialization of reference traversal at zero pulse
MC_MoveAbsolute	Absolute positioning
MC_MoveAdditive	Additive positioning
MC_MoveRelative	Relative positioning
MC_MoveVelocity	Velocity specification
MC_PositionProfile	Start positioning profiling
MC_Power	Switch drive on
MC_ReadActualPosition	Read current position
MC_ReadAxisError	Read out drive fault
MC_ReadBoolParameter	Read Motion Control bool parameter
MC_ReadParameter	Read Motion Control parameter
MC_ReadStatus	Read Motion Control status
MC_Reset	Reset axis
MC_SoftEndSwitches	Set end switch
MC_Stop	Stop axis
MC_VelocityProfile	Start velocity profile
MC_WriteBoolParameter	Write Motion Control bool parameter
MC_WriteParameter	Write Motion Control parameter
Baumüller Module	Task
BM_HomeInit_Block	Initialization of reference run at stop
BM_Jog	Jog mode
BM_ReadAxisStatus	Read out drive status of the axis
BM_ReadParameter	Read parameter
BM_WriteParameter	Write parameter

Your benefit

- ⊙ Reduced development expenditure
- ⊙ Configuration of the functions from a purely technological perspective
- ⊙ Reduction of complexity
- ⊙ Increase in the speed of innovation with a simultaneous increase in software quality
- ⊙ Reduced initial costs



Motion Control Multi Axis

Module	Task
MC_CamIn	Cam disk coupled into
MC_CamOut	Decouple cam disk
MC_CamTableSelect	Initialize cam disk data record
MC_CreateMasterAxis	Create real master axis
MC_GearIn	Gear coupled into
MC_GearOut	Decouple gear
MC_MasterEngine	Create virtual master axis
MC_MoveSuperImposed	Superimposed positioning
MC_Phasing	Execute phase compensation
MC_ReadMasterPosition	Read actual position of axis

Baumüller Module	Task
BM_CamIn	Cam disk coupled into
BM_CamInChangeCurve	Cam disk with various switching conditions
BM_CamInChangeCurveDir	Cam disk with direction-dependent switching conditions
BM_CouplingIn	Position coupling of two axes
BM_GearInAngle	Gear with synchronization
BM_GetCamAngle	Determines the target position from cam disk data
BM_Jog_EV	Jog mode with synchronized target value specification
BM_MoveSuperImposed	Superimposed positioning
BM_Phasing	Execute phase compensation
BM_Syncln	Position coupling to synchronization setpoint

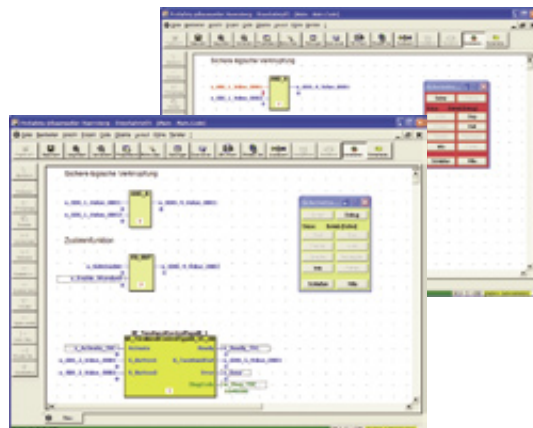
The safety library

Baumüller currently offers 17 safety function modules based on PLCopen Safety which allows for an easy implementation of advanced safety functions.

The comprehensive integration of safety, motion/logic and communication technology in Baumüller automation platforms offers the user high performance and profitability.

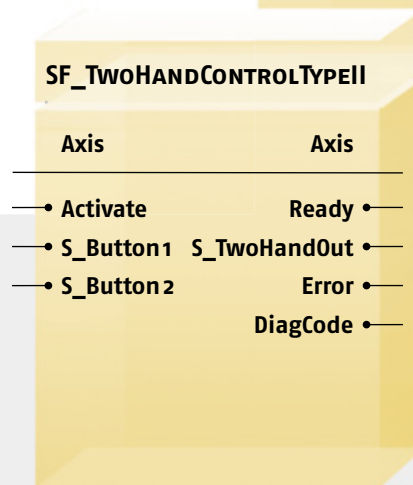
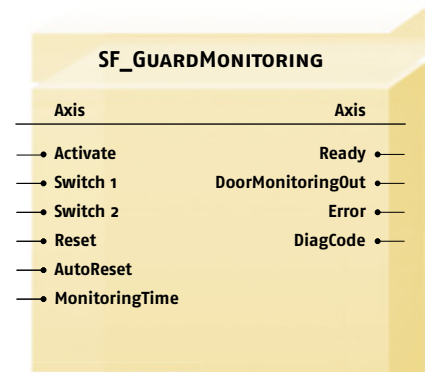


ProSafety is an integral part of the ProMaster Engineering Framework and can be programmed as easily as the common programming languages FBD (Function Block Diagram) and LD (Ladder Diagram) based on IEC 61131-3.



Your benefit

- ⦿ Creation of safety applications from a purely technological and process-oriented viewpoint
- ⦿ Communications programming and expert knowledge in field bus and real-time Ethernet technologies no longer required
- ⦿ Clearly reduced wiring expenditure in conjunction with a programmable safety function



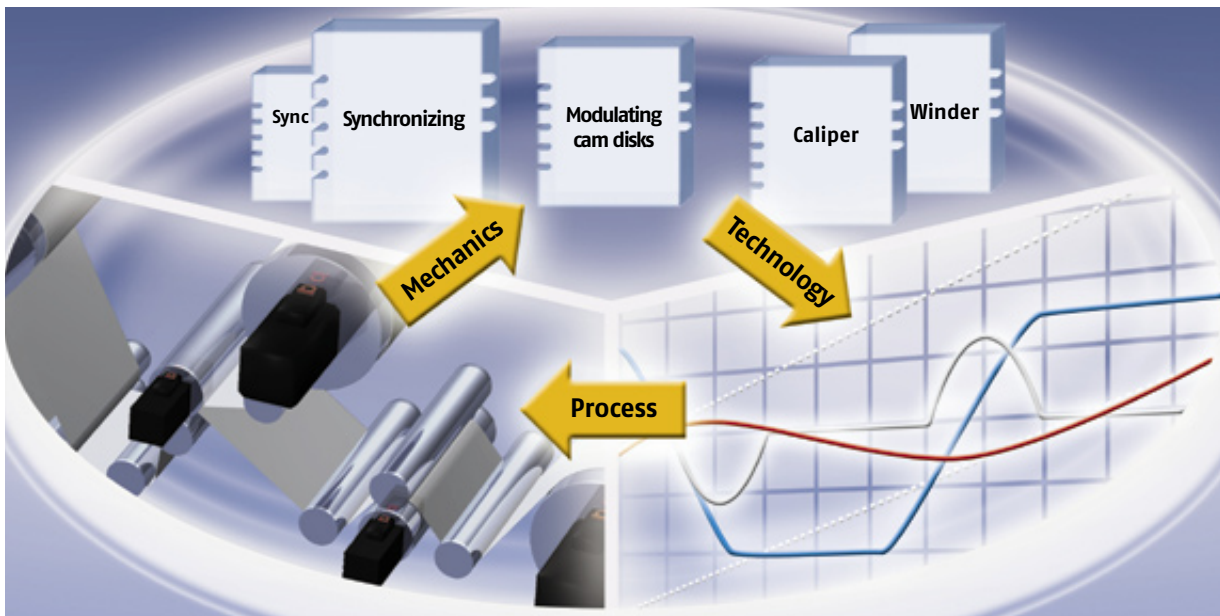
ProSafety modules

Module	Task
SF_Antivalent	Antivalent signal evaluation
SF_EDM	External device monitoring
SF_EnableSwitch	Enable switch
SF_Equivalent	Equivalent signal evaluation
SF_ESPE	Electro-sensitive protective equipment (ESPE)
SF_EmergencyStop	EMERGENCY STOP
SF_GuardLocking	Guard lock
SF_GuardMonitoring	Guard monitoring
SF_ModeSelector	Operating mode switch
SF_MutingPar_2Sensor	Parallel muting with two sensors
SF_MutingPar	Parallel muting
SF_MutingSeq	Sequential muting
SF_OutControl	Output control
SF_SafetyRequest	Safety request
SF_TestableSafetySensor	Safety sensor type 2 test
SF_TwoHandControlTypeII	Two hand control type 2
SF_TwoHandControlTypeIII	Two hand control type 3

Baumüller technology modules

The technology modules from Baumüller can be combined with each other and are based on Motion Control. The precise compensation and synchronization movements can be dynamically adapted to the process of your machine.

An optimized production process for all machine speeds utilizes the full potential of the machine. Your process stipulates the cycle for our technology modules. Machines working continuously or intermittently can implement a variety of tasks, such as dosing, sealing, stamping, transporting, shaping, filling, un-winding/rewinding and positioning, using our technology modules. High process quality with time-optimized and smooth movement is achieved in this way.



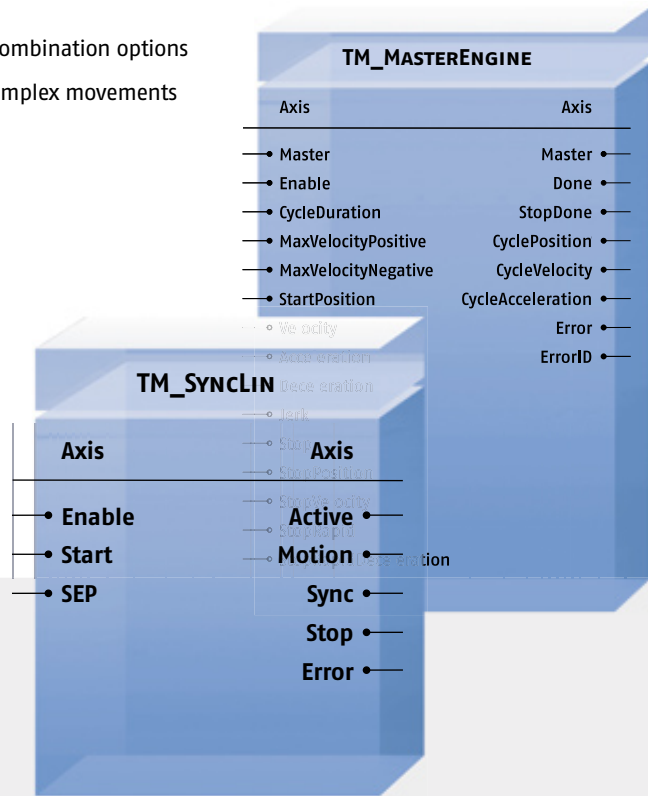
The mechanics

Our technology modules consider mechanical machine functions such as:

- ⊙ Linear axes: linear motors, spindles, toothed racks
- ⊙ Rotational axes: toothed belts, rotary tables, conveyor belts
- ⊙ Eccentrics: knee levers etc.
- ⊙ Linked drives, e.g. handling systems, robots

Your benefit

- ◎ Concentration on the actual machine process
- ◎ Quick and efficient development
- ◎ Great flexibility thanks to the range of technology combination options
- ◎ A small number of machine parameters describe complex movements
- ◎ Templates for many applications



Technology modules

Module	Task
TM_CamStretch	Complex movement sequence design
TM_Spline	Online calculation from support points
TM_SynLin	Cycle-precise linear synchronization
TM_SyncRot	Cycle-precise rotating synchronization
TM_Measure	Measuring sensor evaluation
TM_CamSwitch	Cam switch
TM_TempCtrl	Quick, highly-precise PID-T1 controller
TM_SlipCtrl	Slip compensation
TM_MasterEngine	Virtual master axis
TM_Winder	Winding or unwinding, torque- and dancer-controlled



992 994 996 998

1700

750 800 850 900 950

1001 1002 1003 1004 1005

Fastest real-time Ethernet bus system for all applications in the field of mechanical engineering and process automation: Standard logic, Motion Control, measurement and control technology with integrated IT communication technology. The EtherCAT technology and its further development is actively supported by more than 1700 member companies of the EtherCAT Technology Group.

EtherCAT – Real-time Ethernet

The EtherCAT real-time Ethernet field bus exhibits high performance, low wiring expenditure and openness for other protocols. The complex star Ethernet topology can be replaced with a simple linear structure using EtherCAT. Expensive infrastructure components (switches) are therefore not necessary, but can be integrated for the optional connection of other devices.

EtherCAT even makes it possible to integrate Ethernet down to the I/O level in an economically sensible way.

EtherCAT features:

- ⊙ Full Ethernet compatibility
- ⊙ Internet technology in even the simplest devices
- ⊙ Maximum utilization of the Ethernet bandwidth
- ⊙ Excellent real-time features at low cost

EtherCAT

Ethernet

EtherNet/IP

SERCOS
interface

CANsync

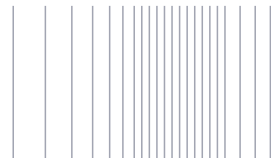
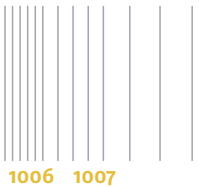
PROFI
BUS

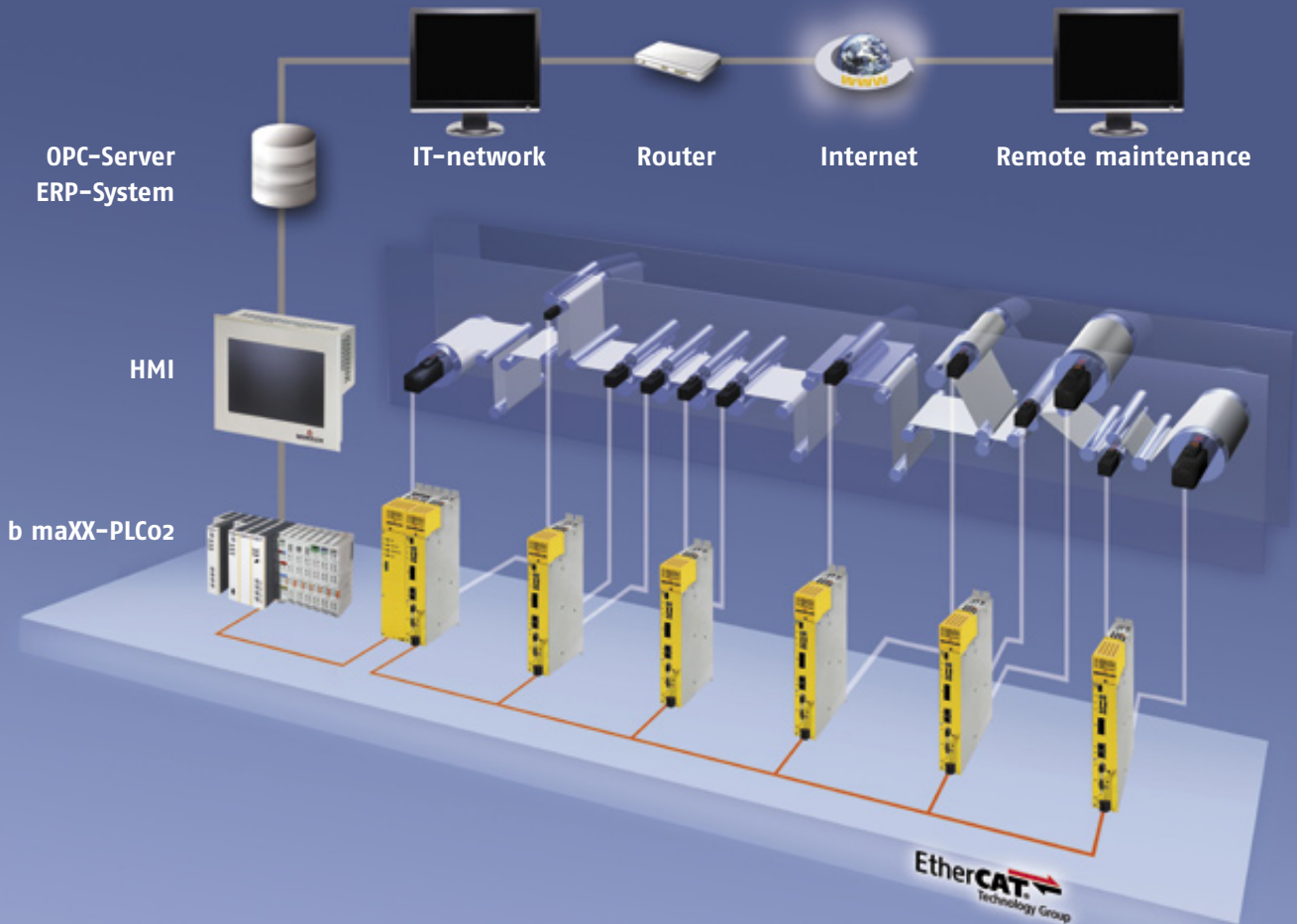
CANopen

VARAN

ETHERNET
POWERLINK

As one of the founding members of the EtherCAT Technology Group, Baumüller recognized the advantages of EtherCAT early on and actively took part in expanding and standardizing EtherCAT. In addition to EtherCAT, Baumüller also supports standard Ethernet and field bus systems, such as Sercos, POWERLINK, CANopen, Profibus, Varan and EtherNET/IP*.

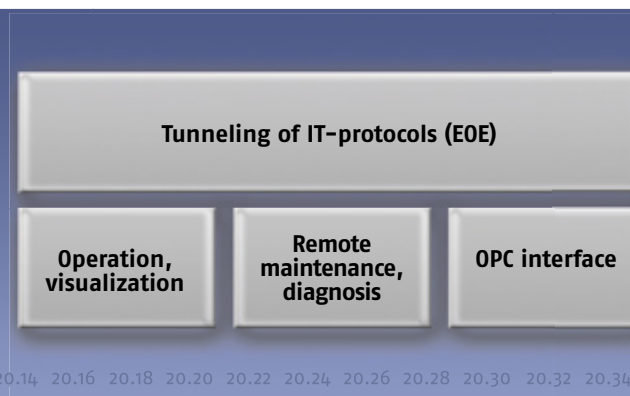


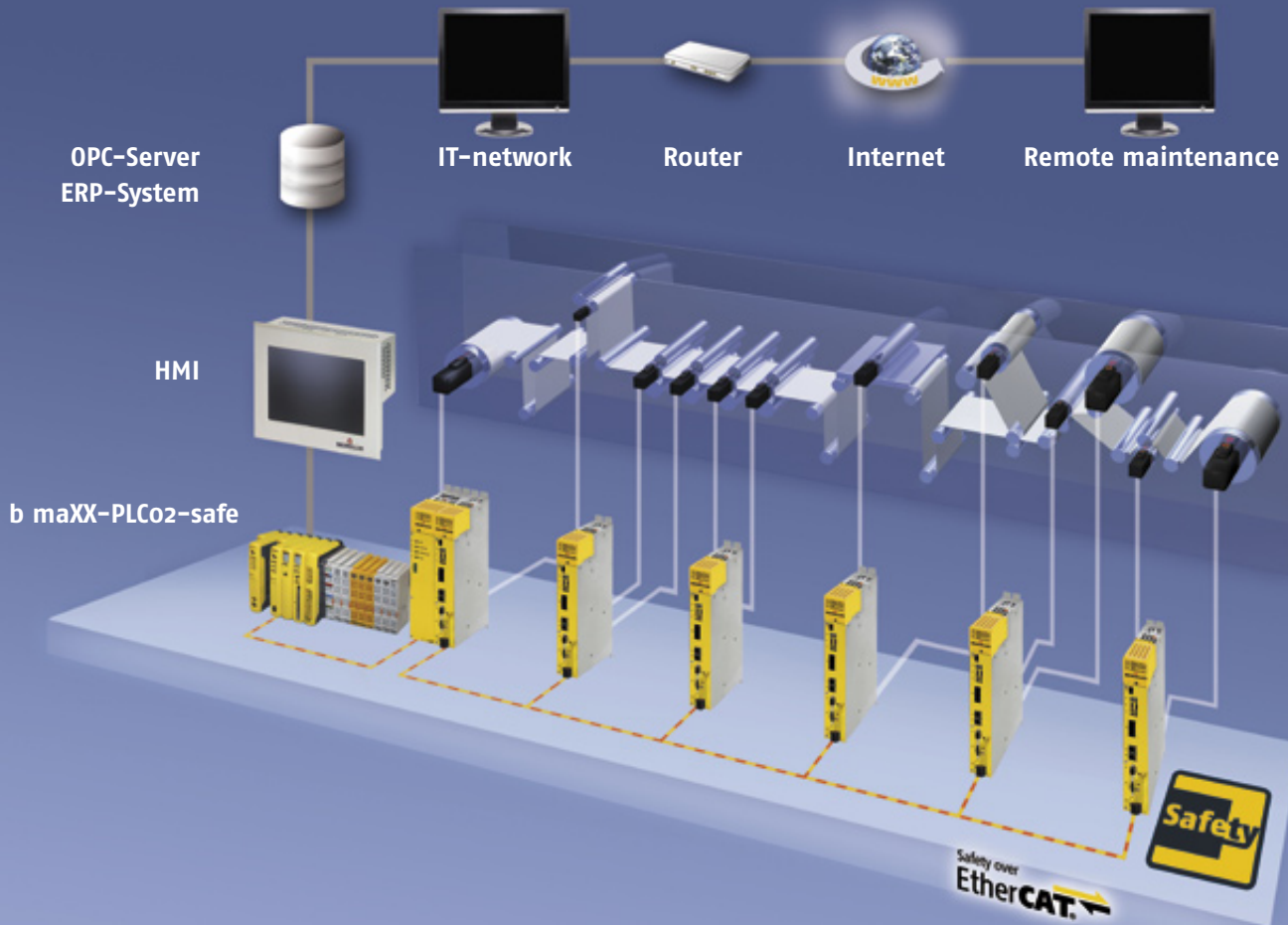


EtherCAT

Baumüller integrates comprehensive real-time communication and the "tunneling" of established IT-protocols, such as TCP/IP on a comprehensive real-time Ethernet network where the following functions can be implemented:

- ⊙ Visualization and operation
- ⊙ Diagnosis
- ⊙ Programming based on IEC 61131-3
- ⊙ Configuration
- ⊙ Remote maintenance
- ⊙ Remote diagnosis
- ⊙ Program updates
- ⊙ Data record updates
- ⊙ Standard Ethernet communication via tunneled IT protocols and the connection of OPC technology





Safety over EtherCAT (FSoE)

- ⊙ International standardized safety protocol
- ⊙ TÜV-certified Safety protocol FSoE for device implementations up to SIL 3
- ⊙ Practically no limitation with regard to the communication medium, the transfer rate or the length of the safe process data
- ⊙ Routing via "gray" channels (Ethernet, gateways, field buses) possible
- ⊙ FSoE telegrams are transferred as process data in the subordinate bus system
- ⊙ Up to 65,535 FSoE devices can be integrated into a network
- ⊙ Safe programming possible with the FSoE network boot
- ⊙ Direct FSoE master-slave communication connection
- ⊙ A watchdog monitors FSoE communication



PLC safety
programming

Safety
parameterization

IEC 61131-3
programming

Standard
parameterization



1 2 3 4 5 6 7 8

3

13 23 33 43 53 63 73

Baumüller supports centralized, modular decentralized and hybrid control architectures, depending on the application. Baumüller provides solutions for each topology with the b maXX-drivePLC, b maXX-controllerPLC, b maXX-PLCo2-Safe and b maXX PCC.

Complete spectrum of control solutions

The b maXX controllers consistently implement the concept of scalability and modularity for flexible and individualized adaptation to the requirements of the mechanical engineer. The b maXX control platforms are fully integrated into the ProMaster Engineering Framework and are even suitable for highly synchronized drives thanks to their real-time capability.

With our b maXX-drivePLC, b maXX-controllerPLC controllers and the new b maXX-PLCo2-Safe controller, we provide comprehensive solutions for every automation technology task. The new b maXX PCC devices expand the power range.

b maXX–drivePLC – one of the fastest in–drive PLCs worldwide

With a typical cycle time of 100 microseconds for 1000 lines of STL, the b maXX–drivePLC is one of the world's fastest PLC's in a drive and is therefore suitable for both comprehensive control tasks and demanding Motion Control tasks. This takes some of the strain off the control PLC, which may be able to be made smaller. The machine program and the Motion Control application can be neatly de-coupled, giving the application transparency and clarity.

b maXX–local–drivePLC – A full controller for the local axle:

The proven b maXX–drivePLC series has been extended by the b maXX–local–drivePLC, which is particularly suited for use with a servo controller and logic programming to handle simple automation tasks that require an economic solution. The b maXX–local–drivePLC, which can be integrated into the servo–controller series b maXX 4400, allows easy creation of control technology programs (according to IEC 61131–3) with ProMaster or PROPROG wtIII.

Technical data b maXX–drivePLC

- ⊙ 32–bit Risc CPU 120 MHz
- ⊙ 6 MB flash memory, 1 MB of which is reserved for the IEC–61131 runtime system, 1 MB for the IEC program and 4 MB for cams
- ⊙ 8 MB SDRAM
- ⊙ 56 KB non–volatile RAM

IEC 61131 features

- ⊙ 2 MB IEC program memory for executable program code containing up to 400,000 STL characters, typically 120,000 STL lines
- ⊙ 2 MB IEC variable storage memory (optional up to 9 MB)
- ⊙ 56 KB NOVRAM for remanent IEC retain data
- ⊙ 4 MB FDisk memory for the storage of cams and configuration data
- ⊙ Cycle time approx. 100 μ s per 1,000 lines of statement list (STL)
- ⊙ Motion control support
- ⊙ Approx. 1.4 MB for debug and logic analyzer functions



Your benefit

- ⊙ **Free programmability of the drive** based on open standard programming in accordance with IEC 61131 and PLCopen Motion Control
- ⊙ **High real–time performance** – Highly synchronized real–time tasks with cycle times from 1 ms
- ⊙ **Increase in availability** thanks to the omission of interference–prone cable connections
- ⊙ **Reduction in the switch cabinet volume** thanks to compact construction
- ⊙ **Constantly stable system** thanks to the high performance of the PLC and servo controller resulting from the use of independent processors – No limitation due to overlapping processes

b maXX-controllerPLC

- ⊙ A scalable PLC platform that is suitable for centralized, decentralized and even hybrid control architectures
- ⊙ A modular control system for PLC and motion control tasks
- ⊙ Up to five additional modules can be connected, e.g., communication modules such as EtherCAT master/slave, CANopen master, Ethernet interfaces, etc.
- ⊙ Direct connection of I/O modules
- ⊙ IEC 61131-3 programming
- ⊙ Compact dimensions save space in the control cabinet and/or terminal box
- ⊙ High real-time performance through highly synchronized real-time tasks



Standard b maXX-controllerPLC BMC-M-PLC-01

- ⊙ 32-bit Risc CPU 120 MHz
- ⊙ 6 MB flash memory, 1 MB of which is reserved for the IEC-61131 runtime system, 1 MB for the IEC program and 4 MB for cams
- ⊙ 8 MB SDRAM
- ⊙ 56 KB non-volatile RAM

IEC 61131 features

- ⊙ 2 MB IEC program memory for executable program code containing up to 400,000 STL characters, typically 120,000 STL lines
- ⊙ 2 MB IEC variable storage memory (optional up to 9 MB)
- ⊙ 56 KB NOVRAM for remanent IEC retain data
- ⊙ 4 MB FDisk memory for the storage of cams and configuration data
- ⊙ Cycle time approx. 100 μ s per 1,000 lines of statement list (STL)
- ⊙ Motion control support
- ⊙ Approx. 1.4 MB for debug and logic analyzer functions

High Performance b maXX-controllerPLC BMC-M-PLC-02

- ⊙ 32-bit Risc CPU 667 MHz
- ⊙ 64 MB flash memory, 16 MB of which is reserved for the IEC-61131 runtime system, 16 MB for the IEC program and 32 MB for cams
- ⊙ 128 MB DDR-SDRAM PC 266 (optional 256 MB)
- ⊙ 100 KB non-volatile RAM

IEC 61131 features

- ⊙ 16 MB IEC program memory for executable program code containing up to 2,000,000 STL characters, typically 600,000 STL lines
- ⊙ 2 MB IEC variables memory (optional up to 9 MB)
- ⊙ 100 KB NOVRAM for remanent IEC retain data
- ⊙ 32 MB FDisk memory for the storage of cams and configuration data
- ⊙ Cycle time approx. 25 μ s per 1,000 lines of statement list (STL)
- ⊙ Motion control support
- ⊙ Approx. 9 MB for debug and logic analyzer functions



Safety integrated b maXX-controllerPLC BMC-M-PLC-02-Safe

- ⊙ 32-Bit RISC-CPU 667 MHz
- ⊙ 64 MB flash memory, of which 16 MB are for the IEC-61131 run time system and 16 MB for the IEC program,
- ⊙ 32 MB for cam disks + safety program
- ⊙ 128 MB DDR-SDRAM PC 266
- ⊙ 100 KB non-volatile RAM

IEC 61131-Features

- ⊙ 16 MB IEC program memory for executable program code with a maximum of 2,000,000 instruction list lines, typically 600,000 instruction list lines
- ⊙ 2 MB IEC variable memory (optionally up to 9 MB)
- ⊙ 100 KB NOVRAM for remanent IEC retain markers
- ⊙ 32 MB flash file system for storing cam disks and configuration data
- ⊙ Cycle time approx. 25 μ s per 1000 instruction list lines plus safety function
- ⊙ Motion control support
- ⊙ Approx. 9 MB for debugging and logic analyzer functions

PC-based control technology

Many industrial sectors increasingly have a common need:

Modern machines are getting faster and more accurate, which makes processes more precise but also more complex. To cope with this development, efficient control systems are increasingly implemented on industrial PCs.

Motion control PLC with open IT interfaces based on PC technology

The user can program the controllers with IEC61131-3 as well as with the open Common Intermediate Language (CIL) in Visual Studio®. Applications can be accelerated by a combination of conventional programming and high-level language.

Baumüller Panel PCs and Box PCs are equipped with high-capacity components and based on open standards used in the world of automation and IT.

They not only comply with high real-time control requirements for calculation-intensive applications but also provide additional functions such as visualization and IT interfaces.

Maximum performance for motion-control applications, a multitude of synchronous drives – all synchronized with time stamps – and rapid data exchange between controller and other bus participants require effective communication.

The EtherCAT industrial Ethernet system fulfills modern requirements for optimal information transfer within the automation system.

Thanks to open, internationally standardized telegrams you use a flexible field bus that is optimized for your application in your automation system.

Your benefit

- ◎ Use the functions of a controller and the services of an open operating system
- ◎ One system for all tasks: PLC, HMI, IT-interfaces
- ◎ Open hardware and software platform
- ◎ Windows operating systems are used worldwide
- ◎ Backup and restore mechanisms for the entire automation system
- ◎ PC-based controllers: performance increase at reduced costs
- ◎ Multicore processors: computing power with defined real-time properties
- ◎ Open communication interfaces (RS232/USB/Ethernet)

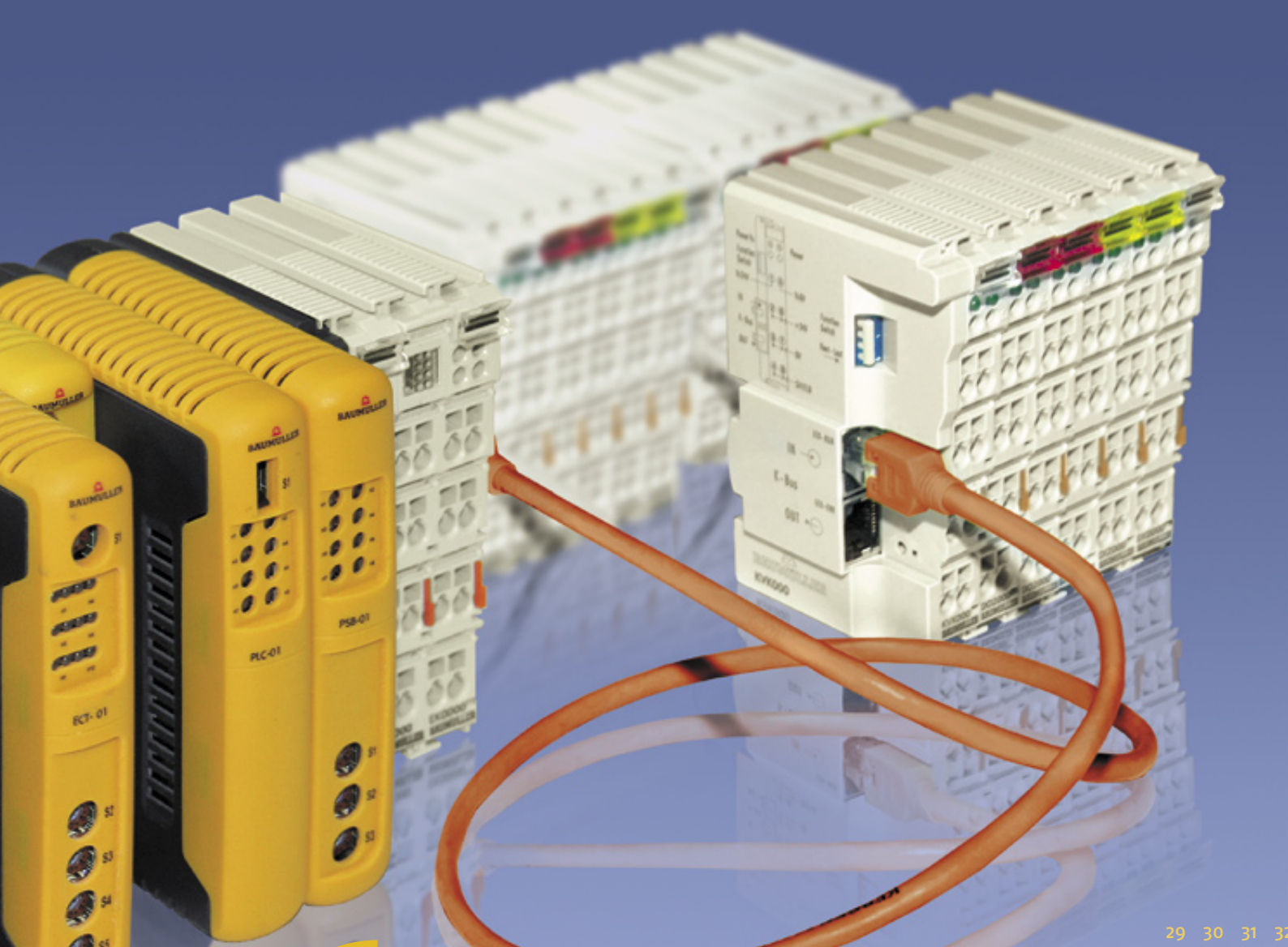
b maXX Panel PC/Box PC – Greatest performance class on the control and communication level

- ⊙ For centralized and hybrid control architectures
- ⊙ Windows 7 Embedded operating system with integrated real-time kernel for complex, highly synchronized control tasks and machine visualization on a module
- ⊙ Based on industrial PC technology
- ⊙ High-performance integrated EtherCAT master
- ⊙ High-precision system synchronization via EtherCAT distributed clocks
- ⊙ IEC 61131-3 programming
- ⊙ Fully involved into an Engineering Framework
- ⊙ Fully comprehensive Motion Control implementation



Technical data

- ⊙ Intel processor (Core 2 Duo 1.5 GHz)
- ⊙ 2 GB RAM
- ⊙ 15 inch resistive touchscreen
- ⊙ Resolution 1024 x 768 (Version Panel PC)
- ⊙ On-board dual Ethernet adapters
- ⊙ 2x compact flash type 1, expanded temperature range
- ⊙ 1 x RS232, 4 x USB 2.0
- ⊙ 24 V DC power supply



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Up to 64 I/O terminals can be operated directly at an I/O node. This means that up to 1020 I/O signals can be processed on site. This reduces the cost of wiring a machine or system.

Couplers & I/O modules product range

Baumüller I/O components provide users with a wide range of modules for adapting to requirements in the best possible way. Industrially compatible signal types can be easily incorporated in the application for evaluation purposes.

The use of I/O islands means that the machine information can be recorded at their "origin", transmitted to the PLC and processed.

Terminals can be aligned with either bus couplers (CANopen and EtherCAT) or the b maXX-controllerPLC in a modular and scalable way, depending on what is required. A variety of modules are available.

The user can therefore implement the machine configuration easily and flexibly.



Couplers (K-Bus)

Function	Type
CANopen coupler, automatic baud rate	CK0000
CANopen coupler, Sub-D 9 pin	CK0001
CANopen coupler	CK0002
EtherCAT coupler, standard I/O	ECK000

Couplers (E-Bus)

Function	Type
EtherCAT coupler, E-Bus	EC000E
EtherCAT coupler, E-Bus with ID-Switch	EC001E



I/O modules

Series	Function	Type	Typ
		K-Bus	E-Bus
Digital input	2 digital inputs, 24 V DC positive switching	DI2000	DI200E
	4 digital inputs, 24 V DC positive switching	DI4000	DI400E
	8 digital inputs, 24 V DC positive switching	DI8000	DI800E
Digital output	2 digital outputs, 24 V DC/0.5 A positive switching	DO2000	DO200E
	4 digital outputs, 24 V DC/0.5 A positive switching	DO4000	DO400E
	8 digital outputs, 24 V DC/0.5 A positive switching	DO8000	DO800E
Analog input	2 analog inputs, 4 to 20 mA	AI2420	-
	4 analog inputs, 4 to 20 mA	AI4420	AI442E
	2 analog inputs, 0 to +10 V DC	AI2010	-
	4 analog inputs, 0 to +10 V DC	AI4010	AI401E
Analog output	2 analog outputs, 4 to 20 mA	A02420	-
	4 analog outputs, 4 to 20 mA	A04420	A0442E
	2 analog outputs, 0 to +10 V DC	A02010	-
	4 analog outputs, 0 to +10 V DC	A04010	A0401E

Series	Description	Type	
		K-Bus	E-Bus
Thermal resistance		AI2PT0	AI2PTE
Thermo-element		AI2TE0	AI2TEE
Counter terminals	Incremental encoder with difference inputs	ZK0000	ZK000E
System terminals	Bus end terminal	EK0000	EK000E
	Feeding clamp 24 VDC	ES0000	ES000E
	I0-Bus extension end terminal	KVE000	-
	I0-Bus extension start terminal	KVK000	-
	E-bus terminal on ECT (RJ 45)	-	EA000E
	E-bus adapter on K-bus	-	E2K000



Safety I/O modules

The **safety input bus terminal** is a digital input terminal for sensors with zero-potential contacts for 24 V DC. The bus terminal features four fault-proof inputs and fulfills the requirements of IEC 61508 SIL 3 and EN 954 Cat. 4.

The **safety output bus terminal** is a digital output terminal with four channels. It switches 24 V DC actuators with up to 2 A total current. If the bus terminal detects a fault, it switches off automatically (fail stop) and thus fulfills the requirements of IEC 61508 SIL 3 and EN 954 Cat. 4.



Series	Function	Type	
		K-Bus	E-Bus
Safety input	4 fault-proof inputs, 24 V DC	SI4000	SI400E
Safety output	4 fault-proof outputs, 24 V DC	SO4000	SO400E



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To operate the machine and for visualization purposes, 6 different models from the bmaxX HMI range are available to the user: from a 3.5" display to a 15" display.

Operating and visualizing with the b maxX HMI

The bmaxX HMI model range is designed for special automation requirements.

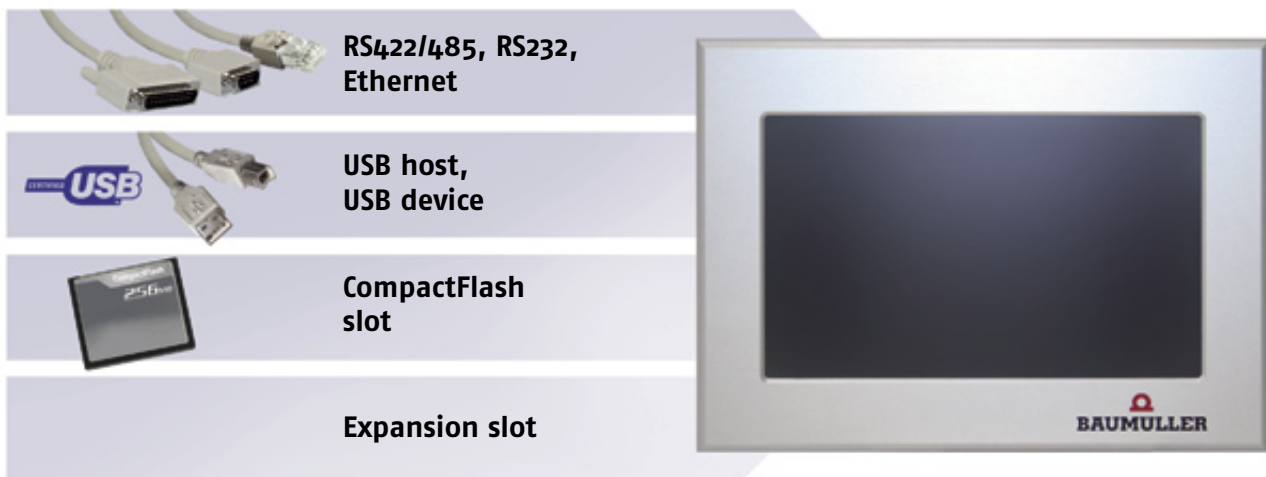
The web-based visualization with the HMIs equipped with a 3.5 inch to 15 inch display meets all the requirements of control panels and visualization. The user-friendly and intelligently designed control and visualization tool ProViz which is integrated in the Baumüller Engineering Framework, Pro Master, allows the machine to be adapted to every production process.

b maXX HMI operating terminals

Baumüller has combined user-oriented operating convenience with a uniform and clear programming tool in the space-saving HMIs.

The spectrum of web-based HMIs ranges from the 3.5 inch touch terminal bmaxx HMI 035W right up to the 15 inch touch terminal bmaxx HMI 151W.

The functionality of the b maXX HMIs includes the option of remote maintenance via a LAN/WAN connection, alarm management and language selection and the associated translation function.



Web functions

Intranet and Internet connection

- ⊙ terminal network via TCP/IP
- ⊙ gateway function

Web server

- ⊙ storage of HTML pages in terminal memory
- ⊙ HTML scripts for access to controller data
- ⊙ Java applet for terminal operation

Data transfer

- ⊙ transmit/receive data via TCP/IP

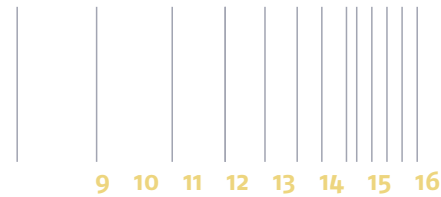
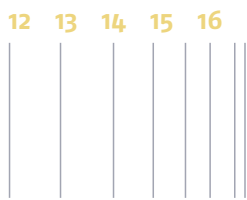
E-mail using SMTP

- ⊙ send e-mails from terminal

User-friendly and intelligent design

The terminals programmed in Windows feature a comprehensive symbol directory constructed using the "what you see is what you get" principle and contain static and dynamic graphics, full windows support, Unicode and many other functions.

Thanks to the block construction and intuitive guidance, the user can orient him- or herself in the programming structure very quickly. In addition to the option of changing objects in the presentations, the user can also define and use self-generated symbols in the individual projects.



Standard functions:

- ⊙ alarm management
- ⊙ recipe management
- ⊙ trends
- ⊙ message libraries
- ⊙ timers
- ⊙ printouts
- ⊙ web functions

Your benefit

- ⊙ Full Windows support
- ⊙ Object-selection window
- ⊙ Display of several projects simultaneously
- ⊙ Configuration of the peripherals
- ⊙ Internal name list
- ⊙ Multilanguage improvements
- ⊙ "Language toolbar"
- ⊙ Unicode (Cyrillic, Chinese etc.)
- ⊙ Text and words
- ⊙ Variables can be imported directly from the PLC
- ⊙ A single database, so the danger of faulty input is ruled out

Technical overview HMI



	b maXX HMI 035W	b maXX HMI 043W	b maXX HMI 057W
Display type	64k TFT	64k TFT	64k TFT
Display format	320 x 240	480 x 272	320 x 240
Background light	LED (white)	LED (white)	LED (white)
Display dimensions	3.5"	4.3"	5.7"
Outer dimensions with interface	120 x 90 x 47	140 x 100 x 54	168 x 126 x 54



	b maXX HMI 070W	b maXX HMI 105W	b maXX HMI 151W
Display type	64k TFT	64k TFT	64k TFT
Display format	800 x 480	800 x 600	1024 x 768
Background light	LED (white)	LED (white)	LED (white)
Display dimensions	7.0"	10.5"	15.1"
Outer dimensions with interface	203 x 147 x 66	260 x 172 x 66	400 x 329 x 72

Communication interfaces: USB, RS485/422, RS323C; Ethernet interface: RJ45, 10/100 MBit;
Flash memory: 32 MB; Application memory: 12 MB; Main memory: 64 MB,
Front protection class: IP 65, Back protection class: IP 20



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Baumüller has been setting a new standard with the converters and controllers of the b maXX series. This drive generation was developed to meet current and future worldwide requirements for automation technology. b maXX constitutes the basis for five different product series when it comes to both simple and complex automation solutions.

⁵⁰⁰⁰ b maXX – Unachieved dynamics and compactness

News from the pioneer of direct drive technology: We present to you the new alignable drive system b maXX 5000 as supplement of our successful b maXX 4000 range. The new range offers a performance spectrum of 1 kW to 35 kW in a rack system. With power supplied and regenerative systems, b maXX 5000 can be used worldwide as an energy efficient drive system. With its Connect Drive System, which enables you to commission our drives efficiently and economically, it displays the perfect expansion of our existing product range.



⁴⁰⁰⁰ b maXX – Modular, scalable, open

Baumüller's approved automation and drive solution b maXX can be adapted to the corresponding demands with respect to performance and equipment through its modularity and flexibility. b maXX 4000 offers a power spectrum from 1,1 kW up to 315 kW with different cooling concepts, such as air and water cooling or cold plate variants. With the series b maXX 4100 a regenerative system is at your disposal, which inserts itself smoothly into the automation solution b maXX. Functional safety relay integrated into the drive available as an option. The peak load and rated load devices (b maXX 4600, b maXX 4700) supplement the proven bmaXX series and are available in five frame sizes. Whether you need maximum output for continuous operation or only for short durations, the b maXX series offers a customized drive solution for every application.



³³⁰⁰ b maXX – Versatile mini servo controller

The servo inverter b maXX 3300 is a high-quality servo controller with integrated position control for power ratings up to 5 kW. b maXX 3300 excels through its compact, space-saving design. The field-oriented control provides for excellent performance. Higher-level speed and position control ensure dynamic and exact positioning. The servo controller is specifically designed for operation with the DSD 28–100 servomotors and the pancake and linear motor series from Baumüller. Functional safety features integrated into the drive are available, as is a manual control device.



²⁰⁰⁰ b maXX – Compact mini servo controller

b maXX 2000 rounds off the converter and controller generation b maXX at the lower end of the power range. The mini servo controller b maXX 2400 (< 60V) is specifically designed for operation with the DSD 28–36 servomotors and the pancake and linear motor series from Baumüller.



¹⁰⁰⁰ b maXX – Highly efficient frequency converter

For a vector control of standard electric motors Baumüller added an high-efficient and easy to operate frequency converter into the program: The b maXX 1000 is available in three sizes with capacity ranges from 0.2 to 11 kW. An integrated EMV filter and various protection and overload monitoring functions ensure a troublefree operation. An extensive control and data management system ensures a continuously and exact overview of the current drive status.



DSDI/DSMI Motors with integrated control and power electronics

The model ranges DSDI and DSMI are servo motors with integrated control and power electronics. These servo drive meet the requirements of modern, decentralized drive architectures in automation. The DSDI is a highly dynamic motor and the DSMI is a high torque servo drive.
Power range 170–385 W (0.23–0.52 hp), speeds up to 4000 rpm, protection rating up to IP65





400

135 200 260 315 400

Baumüller offers an extremely wide range of synchronous and asynchronous motors with shaft heights from 28 mm to 400 mm and many different cooling methods.

DS/DA – General purpose servo motors

The servo motor for all applications with strict energy efficiency requirements.

Type DS: Sizes 45, 56, 71, 100, 132, 160 and 200, power range 0.25–290 kW (0.33–389 hp), speeds up to 6000 min⁻¹, unventilated IP54, ventilated IP23/IP54, water-cooled IP54.

Type DA: Sizes 100, 132, 160, 180, 225 and 280, power range 3.5–400 kW (4.7–536 hp), speeds up to 3000 min⁻¹, ventilated IP23/IP54, water-cooled IP54.



DSC – Compact servo motors

The DSC 45–100 is a series of high-torque servo motors that are up to 30% more compact than conventional servo designs.

Sizes 45, 56, 71 and 100, power range 0.5–18 kW (0.67–24,1 hp), speeds up to 4000 min⁻¹, up to IP65 type of protection



DSP – For high speed performance

For applications requiring high rotary speeds, DSP motors complete the existing DSC range, covering nominal rotary speeds of up to 6000 min⁻¹.

Sizes 45, 56, 71, 100, speeds up to 6000 min⁻¹, up to IP65 type of protection

DSD – Dynamic servo motors

The servo motors for highly dynamic applications with the highest requirements of acceleration capacity and the best start-stop qualities.

Sizes 28, 36, 45, 56, 71 and 100, power range 0.28–37 kW (0.38–49.6 hp), speeds up to 6000 min⁻¹, up to IP65 type of protection

DST – Powerful high torque motors

The high-torque motor DST2 for application with maximum torque requirements.

Sizes 135, 200, 260, 315 and 400, power range 2.7–320 kW (3.6–429 hp), speeds up to 1500 min⁻¹, torque up to 32,900 Nm, IP54 type of protection, water-cooled

GDM & DSM – Disc motors

Baumüller offers a wide range of disc rotors for use in a large number of different applications where installation space is at a premium.

GDM DC disc motors: Power range 16–3000 W (0.02–4 hp)

DSM brushless disc motors: Power range 180–6300 W (0.24–8.4 hp)

DSA external rotor motors

External rotor motors save energy due to their high efficiency rate. Also available are kit solutions for customer-specific installation.

Stator diameter from 74 to 180 mm, performance range from 100 to 300 W (0.13–0.40 hp)

BPx – Baumüller Planetary Gear Series

The BPx planetary gear series in combination with our standard DS/DSD/DSC servo motors are ideally suited for applications with high demands on torque and dynamic.

Baumüller Linear drives

The linear motor components LSE10/LSM10 can achieve maximum thrust forces of up to 14.750 N. Customized motor concepts can be realized using a modular system.

DSDI/DSMI motors with integrated control and power electronics

The model ranges DSDI and DSMI are servo motors with integrated control and power electronics. These servo drive meet the requirements of modern, decentralized drive architectures in automation. The DSDI is a highly dynamic motor and the DSMI is a high torque servo drive.

Power range 170–385 W (0.23–0.52 hp), speeds up to 6000 rpm, protection rating up to IP65



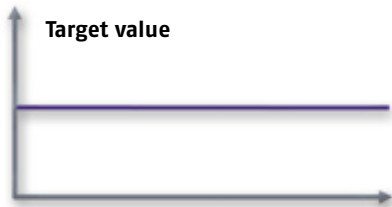
ProVibCon



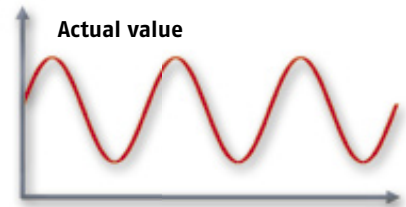
Vibration compensation

Active vibration compensation with Baumüller Vibration Control

We engineer a regulated system – out of the drive and your machine, from a controlled drive system. Baumüller Vibration Control makes the active vibration compensation usable on our control system.



Before



ProVibCon: Your route to vibration exclusion

Application

- ⊙ For periodically arising faults on cylindrically operating machines, irrespective of their cause e.g. gearbox vibrations, crank faults, coupling vibrations, process-created vibrations etc.

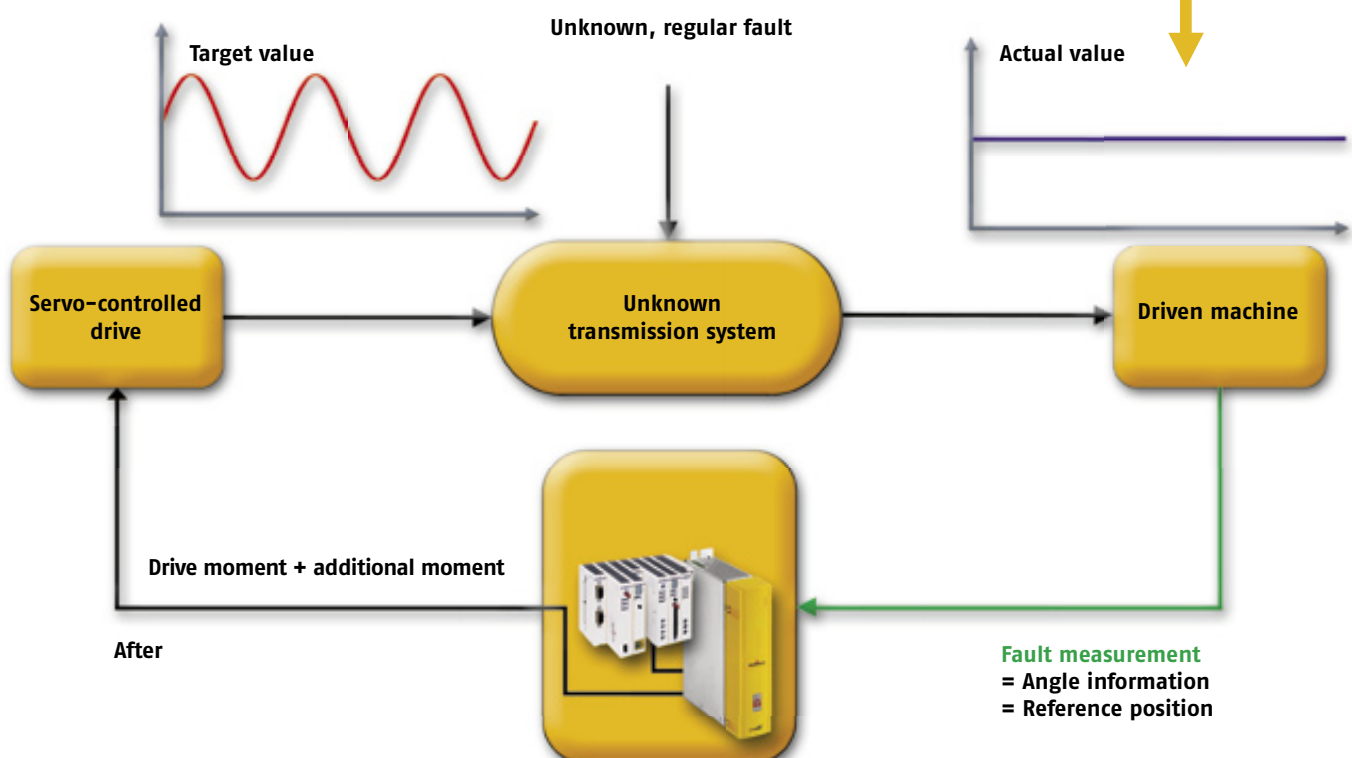
Properties

- ⊙ Systematic calibration and optimization of each axis
- ⊙ Convenient operating panel
- ⊙ Highest level of flexibility
- ⊙ Using existing technology and extending slightly

Customer benefits

- ⊙ Effective vibration reduction
- ⊙ Reproducible quality products
- ⊙ Productivity and convenience on the machine increases
- ⊙ Simple to retro-fit

ProVibCon



Automation solutions
 Planning & development
 Project management
 Hardware & software engineering
 Control cabinet design
 Sheet metal solutions
 Components
 Electrical installation
 Commissioning
 Expansion of existing systems
 Technical support worldwide
 Assembly
 Training
 Service
 Maintenance
 Repair
 Retrofit



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You can contact us on our Service Hotline +49 (0)911 5432-133 twenty-four hours a day on 365 days of the year.

Automation solutions by Baumüller

Cooperation with development partners, who contribute to the entire solution in a system-oriented way, is a precondition if you want to concentrate on your own competencies in the field of machine building. If your automation partner supports you during the realization of your system concept, you receive the development, project management and the optimal adaptation of a drive solution from one source.

From the plastics to the packaging industry, from the textile to the printing industry, Baumüller is an innovative system partner of the capital goods industry. We provide solutions for automation, electrical and drive engineering throughout the entire life cycle of a plant.

It goes without saying that in addition to our complete package consisting of engineering, installation, commissioning and services, we offer customer service with perfect coverage – namely anywhere in the world and at any time.

We are the partner for your success.

Planning & development

Baumüller is an innovative development partner of machine builders. Already in the early product development stages, we concept and develop an economical and technologically future-proof plant together with you.

Project management

Our project leaders ensure the implementation of turnkey equipment.

Hardware & software engineering

From the dimensioning via cabling to air conditioning of your control cabinets, we design your hardware taking account of all design and manufacturing options that are technologically innovative, user-oriented and as economical as possible.

Control cabinet design & sheet metal solutions

From sheet pieces to completely wired control cabinets, Baumüller has realized individual solutions for well-known machine and plant builders as well as for medical and electro engineering for years. In order to meet the needs and requirements of the capital goods industry of demand-oriented products, as a competent system partner we offer everything from one source. From planning to construction, over sheet metal production and series wiring up to assembly and installation on site – worldwide. Our control cabinet design is certified according to UL 508a.



Electrical installation & Commissioning

You construct the mechanics of your system, we design and install the electronics. Whether inhouse or worldwide at your customer's site – with our software solutions and drive technologies we set your machine ideas in motion. For the worldwide installation and commissioning of your systems, we always take account of the respective country-specific standards.

Expansion of existing systems

Innovative and customer-specific products require state-of-the-art production methods and machine functions. Using an adaptation or expansion of your existing machine architecture, you quickly achieve an increased flexibility and availability of your systems – while allowing you to estimate your expenses and manage your investments.

Technical support worldwide

Whether it is remote diagnosis and remote maintenance using telecommunication or the Internet, through our 24-hour hotline or our contact partners at branch offices onsite in more than 40 locations worldwide – the experts from Baumüller provide full explanations to all your questions concerning automation and drive solutions.

Assembly

The Nürmont Installations GmbH & Co. KG has over twenty years of experience in the field of assembly and relocation of machines and plants. Nürmont operates globally and offers solutions from one source. Beginning with project planning up to after sales service – also as a main contractor – Nürmont covers all relevant services in the assembly and relocation field. Together with logistics, special part manufacturing and electrical assembly, as well as commissioning and service support.

Training

Only with well-trained employees you can quickly respond to challenges. We offer training onsite and in our training center. On the basics of electrical drive engineering, on maintenance of switching stations, controllers and drives, and on selective troubleshooting in the broader range of printing technology and drive engineering. In cooperation with you, we create a flexible training program that is specifically tailored to the training needs of your employees.

Service

The correct repair and spare parts must instantly be available to immediately remedy a failure of your system. In cooperation with you, we develop an extensive service plan and make a technically sound and cost-optimized selection of components that you should keep on hand. We ensure the functional state of your stock of spare parts and deliver components that are missing in an emergency – day and night via express.

Maintenance

A professionally maintained machine means safety. Safeguarded production and safety for your employees. Our Condition Monitoring Systems, for example, recognize in advance possible causes of failure and increase the availability of your machine.

Repair

The extensive experience, our know-how, as well as the technical equipment of our worldwide subsidiaries are the basis for high quality repair of your electrical units and electrical machines, from exchanging broken parts up to general overhaul – independent of the manufacturer.

Retrofit

We retrofit existing systems with up-to-date drive systems, control cabinets and user interfaces, so that your system can execute a failure-free, state-of-the-art production. With a retrofit of your existing machine architecture, you are able to achieve higher system flexibility and availability in a very short time.

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