PacDrive 3:
The future of motion-centric machine automation

2012

Schneider Electric™

Automation Solutions with PacDrive 3...

...faster
time-to-market
for your machines

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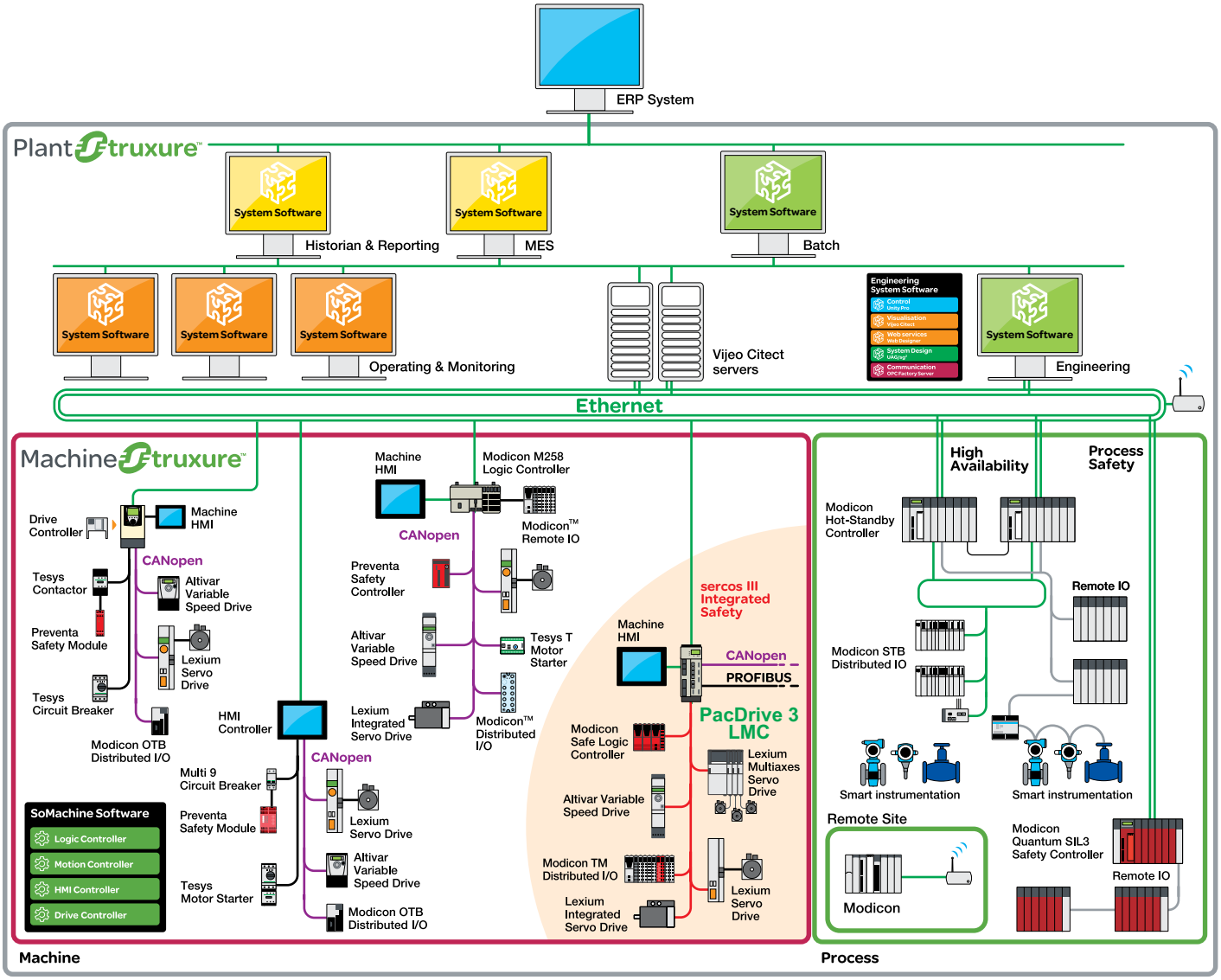
Your solutions partner for your entire factory

Schneider Electric is a trusted, global provider of a full range of products and solutions for energy distribution and management, building automation and installations, and industrial automation. With more than 100,000 employees in over 100 countries, 207 production facilities, and more than 16,000 sales offices worldwide, Schneider Electric can provide expert, on-site assistance in the design and development of automation process systems, equipment manufacturing, and plant engineering.



Working in perfect harmony:

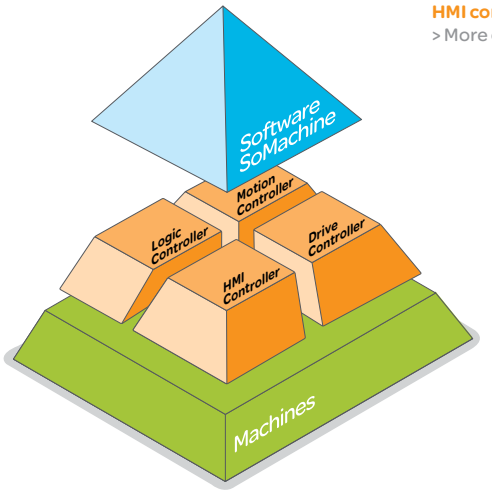
Together – PlantStruxure™, for automation of processing systems, and MachineStruxure™, for automation of individual production machines – provide scalable, fully integrated solutions for your entire factory and production lines. PacDrive 3 (in shaded area above) is the logic motion control solution for MachineStruxure.

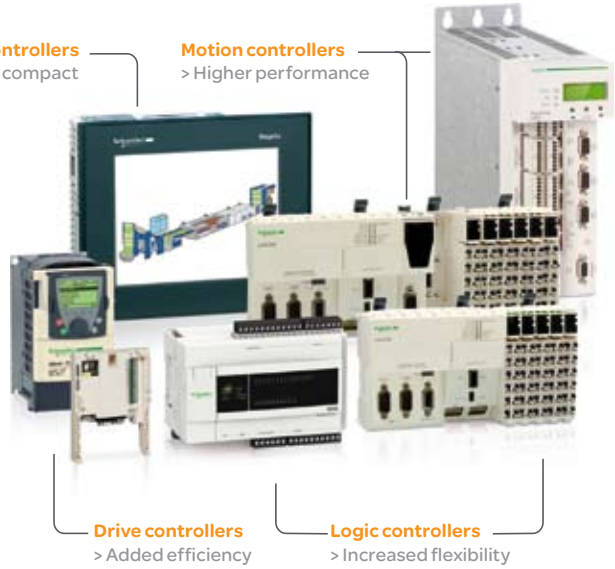
Fully Integrated Automation Solutions

Using its proven PlantStruxure™ and MachineStruxure™ architectures, Schneider Electric can leverage its comprehensive product portfolio for industrial automation to achieve a single, fully integrated solution. Everything works together smoothly because scalable control technology provides flexible automation of both individual machines and processing systems. Each solution can be supplemented by a wide range of Schneider Electric products that improve performance and increase efficiency at multiple levels – from an entire factory to a single production line, or individual machine.

Schneider Electric also supplies solutions for the vertical integration of production processes. SCADA and MES solutions by Schneider Electric create a seamless connection between production floor and management systems. As a powerful, PC-based control and monitoring system, the scalable Vijeo Citect™ SCADA software is suitable for a wide range of needs, from small companies to large corporations with highly complex processes and demanding availability requirements. Additional software systems enhance the range of solutions available for processes at different levels of the factory.

Schneider Electric provides a number of products and solutions for power distribution and conversion, for both primary and secondary distribution. This includes wiring and cabling technology, and switchgear technology for supplying electrical power to machines and production systems. The company also has extensive expertise in the areas of energy management and metering technology, and has its own subsidiary for building automation and safety technology.





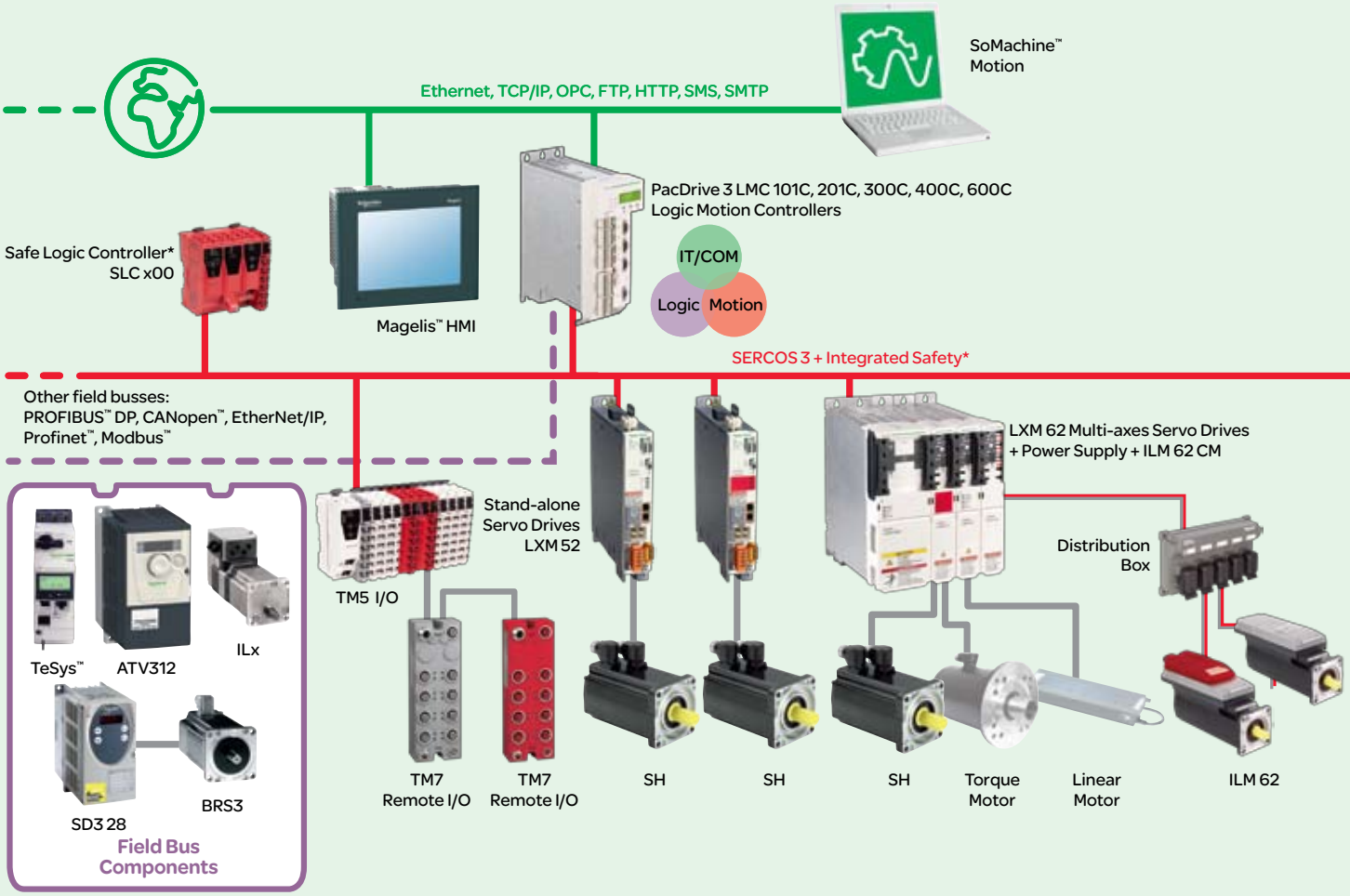
Different controllers, one software: SoMachine™ is your engineering workbench for Flexible Machine Control

Flexible Machine Control with SoMachine™

The goal of shortening development times in machinery and plant engineering was the driving force behind Schneider Electric's creation of Flexible Machine Control. The term Flexible Machine Control refers to a concept that consolidates the various mutually supplementing control platforms in MachineStruxure under the umbrella of a single software solution: **SoMachine**. Using **SoMachine**, the entire range of controllers, from simple drive-based controllers to high-performance motion controllers, can be programmed and put into operation using a single engineering workbench. This concept requires no new tools or training. And, it allows users to perform engineering tasks in the same familiar software environment, regardless of the respective control platform. Comprehensive software libraries with tested Application Function Blocks provide valuable support.

For production, packaging, material handling, and robotics...

Complete automation solutions with PacDrive 3



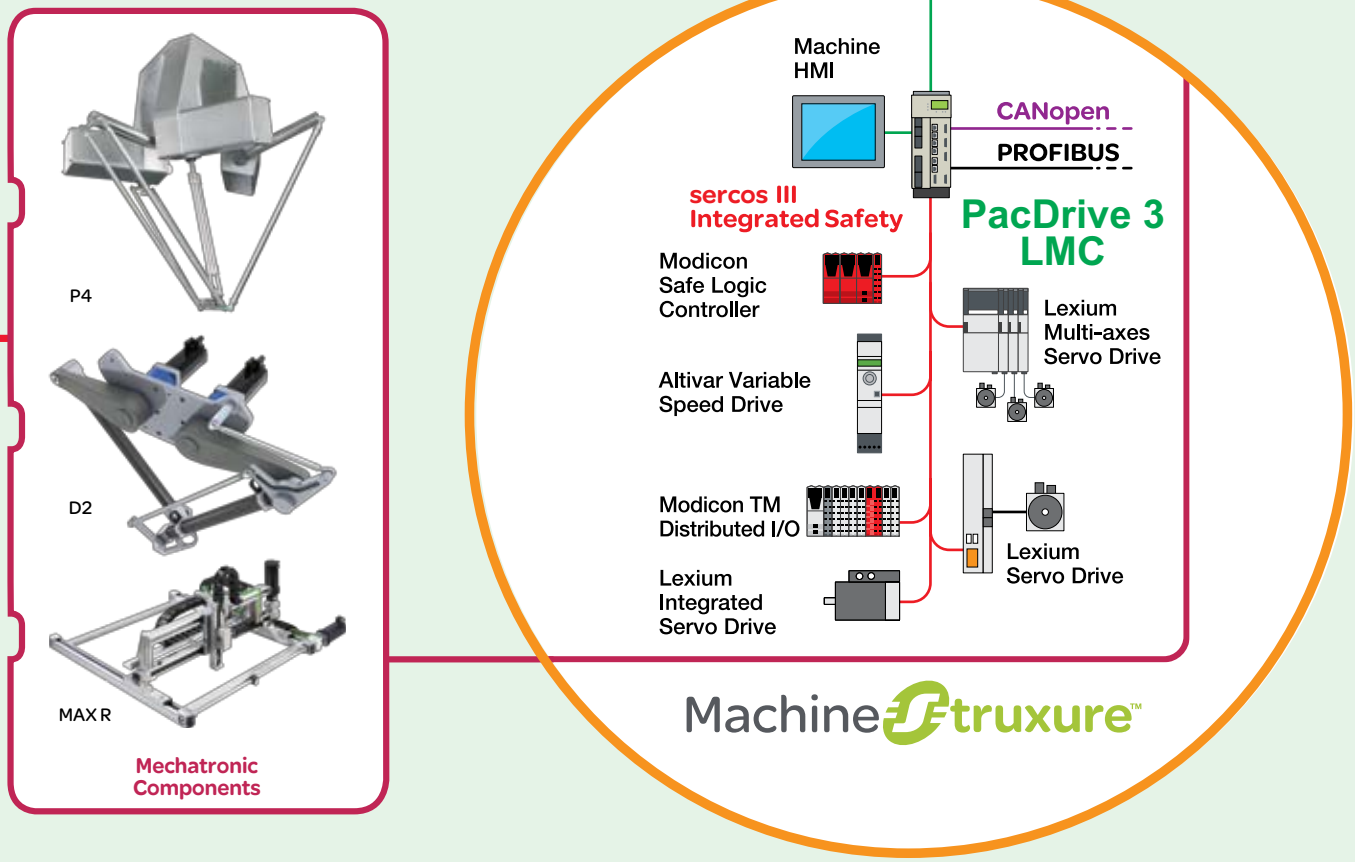
One integrated automation platform, one versatile automation bus

Based upon proven motion-logic technology, the PacDrive 3 automation solution from Schneider Electric unifies PLC, motion, and robotics control functionality on a single hardware platform. With its centralized system architecture, PacDrive 3 is the ideal solution for controlling a broad range of servo-driven production and packaging machines, as well as material handling equipment and robotics – using fully integrated, IEC 61131-3-compliant program structures.

Schneider Electric SERCOS 3 technology enables the entire communication process for PacDrive 3 automation solutions to flow through a fully integrated, Ethernet-based automation bus. PacDrive 3 system components are part of a broad overall portfolio that includes HMI, automation, and electrical equipment, that together create complete single-source solutions for demanding machinery applications.

The foundation for fully integrated solutions:
Interoperability between PacDrive 3 and the extensive portfolio of HMI components, automation, and electrical equipment, allows users to create single-source solutions.

* according to IEC 61508:1998, EN/ISO 13849-1:2008

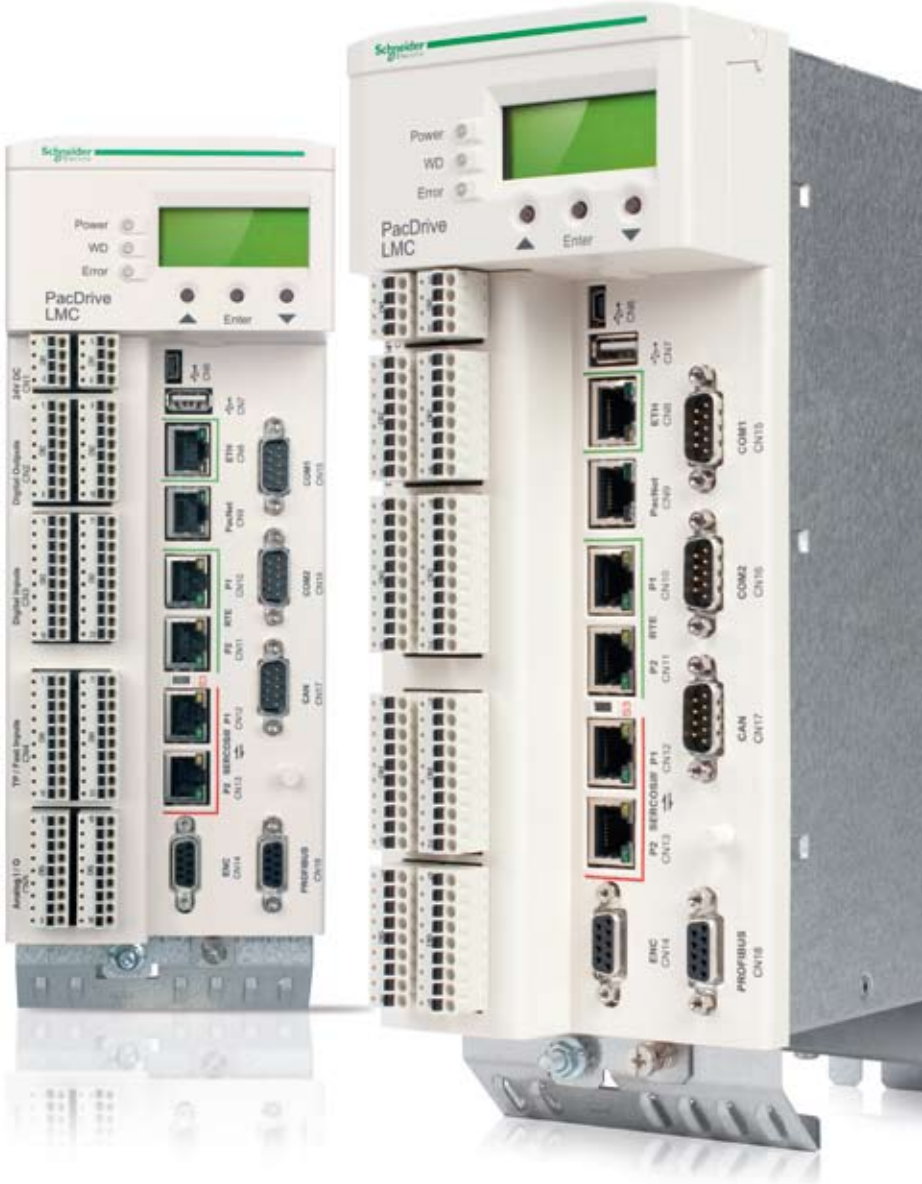


PacDrive 3's proven technology provides a flexible, robust hardware platform for MachineStruxure's logic motion automation solutions. As the new generation of the successful PacDrive M System, PacDrive 3's scalable controller performance allows economical automation of applications – ranging from small systems with only a few servo axes to high-performance solutions with up to 99 servo axes or 30 robots.

* according to IEC 61508:1998, EN/ISO 13849-1:2008

PacDrive 3: Sustainable automation solutions...with lower engineering costs

For years, Schneider Electric has pursued a technological approach designed to consistently reduce hardware and software complexity. Our consistent objective has been to hold the line against rising engineering costs for design, installation, and commissioning. PacDrive 3 technology opens up new opportunities for achieving this goal, and also introduces new approaches for long-term cost savings.



Higher performance with increased scalability

The PacDrive 3 Controller from Schneider Electric provides a wide range of scalable performance for synchronized multi-axis motion, PLC functionality, and robotic control – on a single hardware platform – for both complex and simple machine configurations. Performance in the upper end of the range is sufficient for up to 99 servo axes or 30 robots. At the lower end of the range, new controllers for a maximum of 4 or 8 servo axes are designed for more economical automation of simple machines. This approach delivers fully integrated control technology for both simple and highly complex applications!

Fully integrated Ethernet-based communication

With the addition of SERCOS 3, Schneider Electric has created the first fully Ethernet-based communication solution for PacDrive applications, enabling communication with both drives and field devices. SERCOS 3 can also streamline the integration of safety automation*, and is a true standard. It does not rely upon a specific manufacturer, and it's one of the most powerful Ethernet-based communication solutions currently on the market.

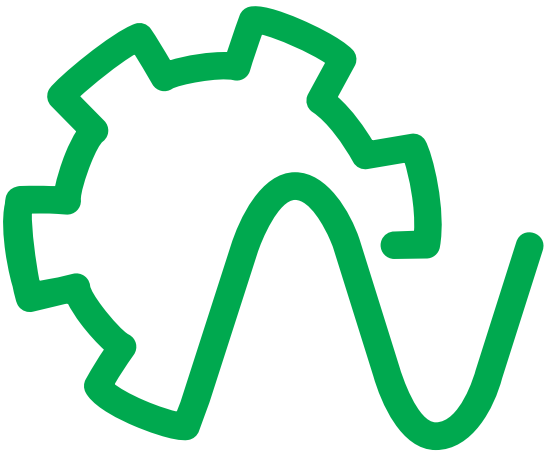
sercos
the automation bus

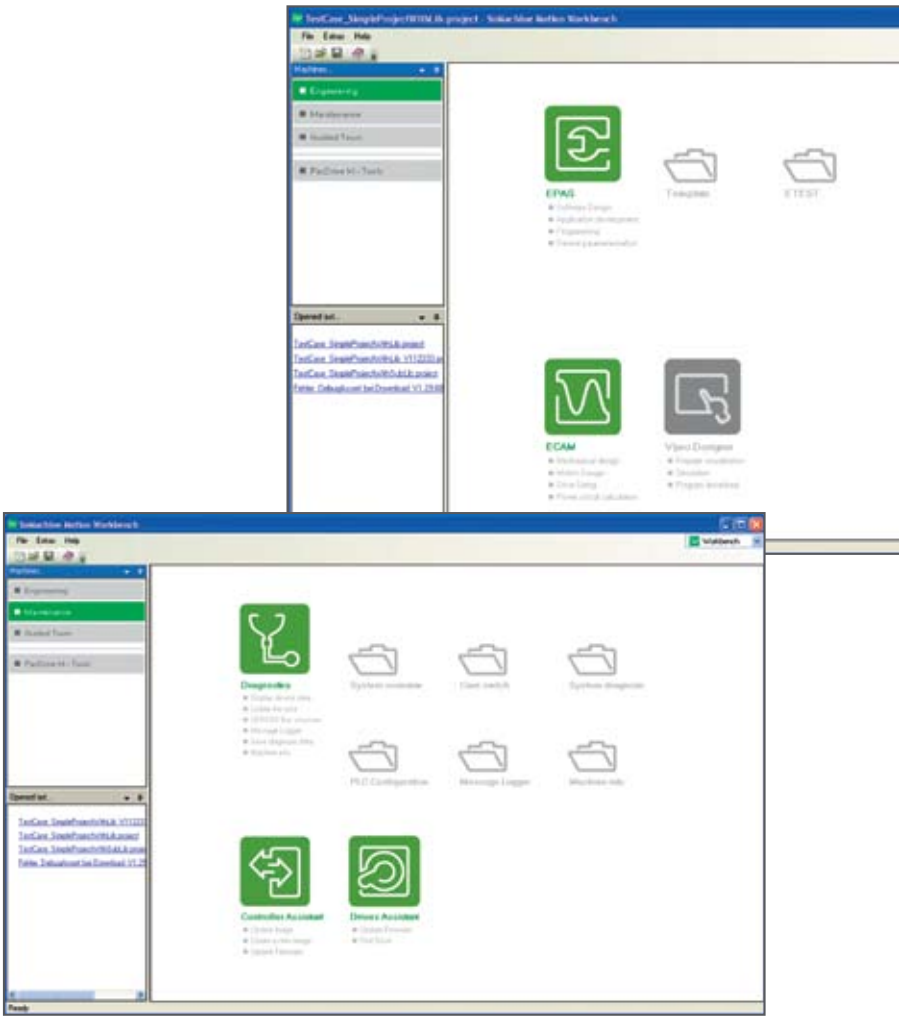
* according to IEC 61508:1998, EN/ISO 13849-1:2008

Flexible Drive Design by Schneider Electric

Innovative drive design allows flexible drive architectures. A multi-axis system, in which single and dual-axis servo drives are connected to a shared power supply, reduces costs and space requirements in systems with more than four servo axes. Pluggable interconnects and a quick-connect front-side bus also reduce installation costs.

For compact applications with a small number of servo axes, the newly developed stand-alone servo drives offer a more cost-efficient approach to automation.





SoMachine™ for your machine...

SoMachine Motion is the new software from Schneider Electric for your entire engineering process, including: commissioning of PacDrive 3 and diagnostics. **SoMachine Motion** includes tools for motion design and drivetrain design (ECAM), program development (EPAS with ETEST, Vijeo Designer™), diagnostics, and data handling (assistants) – all in a single package.
A Safety Editor has also been added for safety automation* software development.
EDESIGN is a new type of graphic structuring of machine functions – to further simplify software engineering.

The latest programming standards

EPAS, SoMachine Motion's central software development tool, is based upon CoDeSys V3, and offers groundbreaking potential in object-oriented programming.

CoDeSys

* according to IEC 61508:1998, EN/ISO 13849-1:2008

PacDrive 3: Proven, trusted technology

International Acceptance

In the consumer goods, durable goods, and capital goods industries, machine buyers are the primary decision-makers when it comes to choosing the best automation systems for their production and packaging machinery. PacDrive systems from Schneider Electric have built an excellent reputation among many European and international machine manufacturers with their...

Proven technology

PacDrive is a tested technology based upon internationally accepted open IT standards that conform with IEC… and has demonstrated its capabilities extensively since its introduction in 1998. Already more than 55,000 machines worldwide have been automated with PacDrive systems. Schneider Electric is also well-regarded around the world, with a reputation for long-term reliability.

Compliance with OMAC and Weihenstephan Standard

For international manufacturers of consumer goods products, the OMAC User Group's PackML state machine plays an important role in integrating production and packaging machinery for production lines. The creators of PacDrive 3 were active participants in OMAC from the very beginning, and integrated the OMAC guidelines into PacDrive.

The Weihenstephan standard of making production data available to management systems has become increasingly important in the beverage industry. PacDrive provides software Function Blocks for implementing this standard.

At a glance:
LEDs and system messages displayed in plaintext often provide crucial information about error locations.

High availability thanks to effective diagnostic tools...

Maintaining equipment availability depends on how quickly operators can localize malfunctions and eliminate errors. PacDrive controllers provide basic diagnostic information in plaintext on an integrated display. A free diagnostic tool is also available for PacDrive users…both machine builders and operators. Any improper operation can be traced, regardless of the individual machine's diagnostic capabilities. The diagnostic tool contains almost the same functionalities as the programming and commissioning tool for engineering, without the risk of unintended changes to the machine program.

Simple servo drive configuration:
Less mechanical effort, no parameterization – the centralized controller automatically configures servo drive and motors by using their electronic name plates

Plug-and-play technology for fast component replacement

The ability to easily replace the electronic components responsible for improper operation is just as important as a rapid diagnosis of the improper operation itself. PacDrive users can quickly change-out servo drives or servo motors using the system's plug-and-play technology. Parameterization of replacement components via laptop or software installation is unnecessary. The centralized PacDrive controller detects the replacement components or motors by their electronic name plates, and configures them automatically. There is also no need to activate switches for the SERCOS or IP address. The controller performs a firmware check and updates when the equipment is replaced.

Standards instead of proprietary control technology: IEC 61131-3-compliant programming languages are familiar to technical personnel, thus reducing the need for time-consuming training sessions in proprietary programming solutions

Faster training thanks to standardized programming

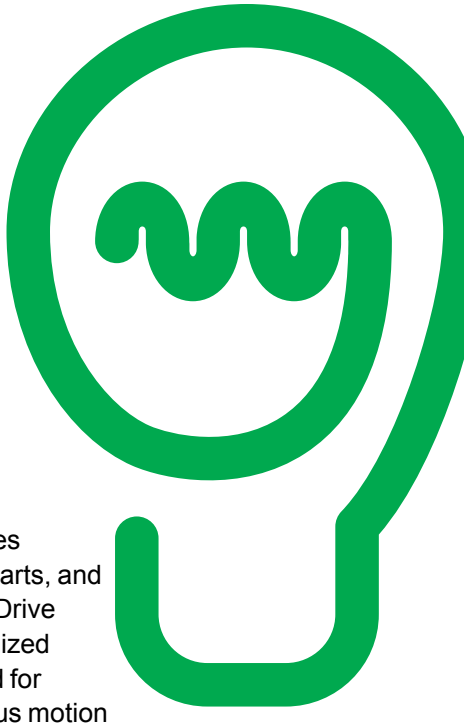
Consumer goods manufacturers are very enthusiastic about the fully integrated IEC 61131-3-compliant program structure in machines automated with PacDrive. These companies generally have personnel who are familiar with IEC programming, and can handle retooling of lines or machine adjustments internally. The proprietary, manufacturer-specific programming concepts so common in robot-assisted machine designs, on the other hand, demand intensive training. A training program for PacDrive 3 is available, as well as a migration seminar for the changeover from PacDrive M to PacDrive 3. The new PacDrive 3 training program will include training modules on programming, commissioning, and service, as well as mechatronic design and robotics.

Remote maintenance options

Remote maintenance reduces travel costs and increases availability by accelerating response times. PacDrive provides the interfaces and/or protocols needed for remote maintenance via the Internet, modem, and mobile telephony. Schneider Electric provides advice and support to machine users and machine builders for integration of the most practical options – worldwide.

Energy efficiency – a selling point with a future!

The consumer goods industry places a premium on energy-efficient manufacturing systems, with lower energy use proven to reduce machine lifecycle costs. Another important factor in the competition for market share, is to be seen as a "green" company. Environmental consciousness is increasingly important to consumers. Develop an energy-efficient production and packaging system, and you too can benefit from a greener image. Schneider Electric makes it easy for you with PacDrive 3.



Efficient motor technology from Schneider Electric...

Servo technology is one of the most efficient ways of transforming electrical energy into kinetic energy. Among industrial electrical motors, the high efficiency of servo motors makes statutory minimum efficiency levels a non-issue. This is particularly true for PacDrive servo motors. Whether you are using standard servos or servos with an integrated servo drive, all Schneider Electric PacDrive 3 motors deliver high efficiency and low inertial loads.

DC bus sharing and energy recovery

DC bus sharing among servo drives is a standard feature for PacDrive 3 LXM 62. Thanks to the front-side quick-connect, no additional installation is required to connect to the bus. DC bus sharing is particularly well suited for packaging machines with servo drives that don't all need power at the same time. The generous storage capacity in these servo drives and their power supplies, optimizes the energy produced during a process.

Automation with less heat... without control cabinets

Like other electronic components, servo drives in the control cabinet generate heat. If the resulting heat exceeds permissible levels, then the control cabinet needs to be cooled, consuming precious energy. Schneider Electric ILM servo motors – with integrated drive electronics – require only a shared power supply in the control cabinet. This lowers heat in the control cabinet and reduces the need for climate control.

Energy-optimized motion design

Technically optimized motion sequences require less power, put less stress on parts, and can be executed with less energy. PacDrive Tools create the basis for energy-optimized motion design, which reduces the need for braking energy. These tools offer various motion rules for simulating different approaches, or they can use blending functions to create ideal pick-and-place paths for robots.

Save energy with the PacDrive 3 "intelligent line shaft"

When machine speeds increase, some individual axis movements exceed their set energy consumption limits. This circumstance can't be changed if the system uses an electronic line shaft that rigidly synchronizes all of the axes with the master. The alternative – the PacDrive 3 "intelligent line shaft" – offers a new approach. Here the virtual master can activate a speed profile over the course of a machine cycle, increasing speed only for portions of the motion profile that do not involve critical changes in energy consumption. The speed of the critical individual axis movements, however, is increased only up to a predefined limit.

Logic motion control – the key to standardized, cost-effective solutions

For more than a decade, a central element in Schneider Electric's PacDrive technology has been the integration of motion, PLC, and IT functionalities on one automation platform. This allows the creation of fully integrated software structures that enable modular machine designs and help reduce engineering time.

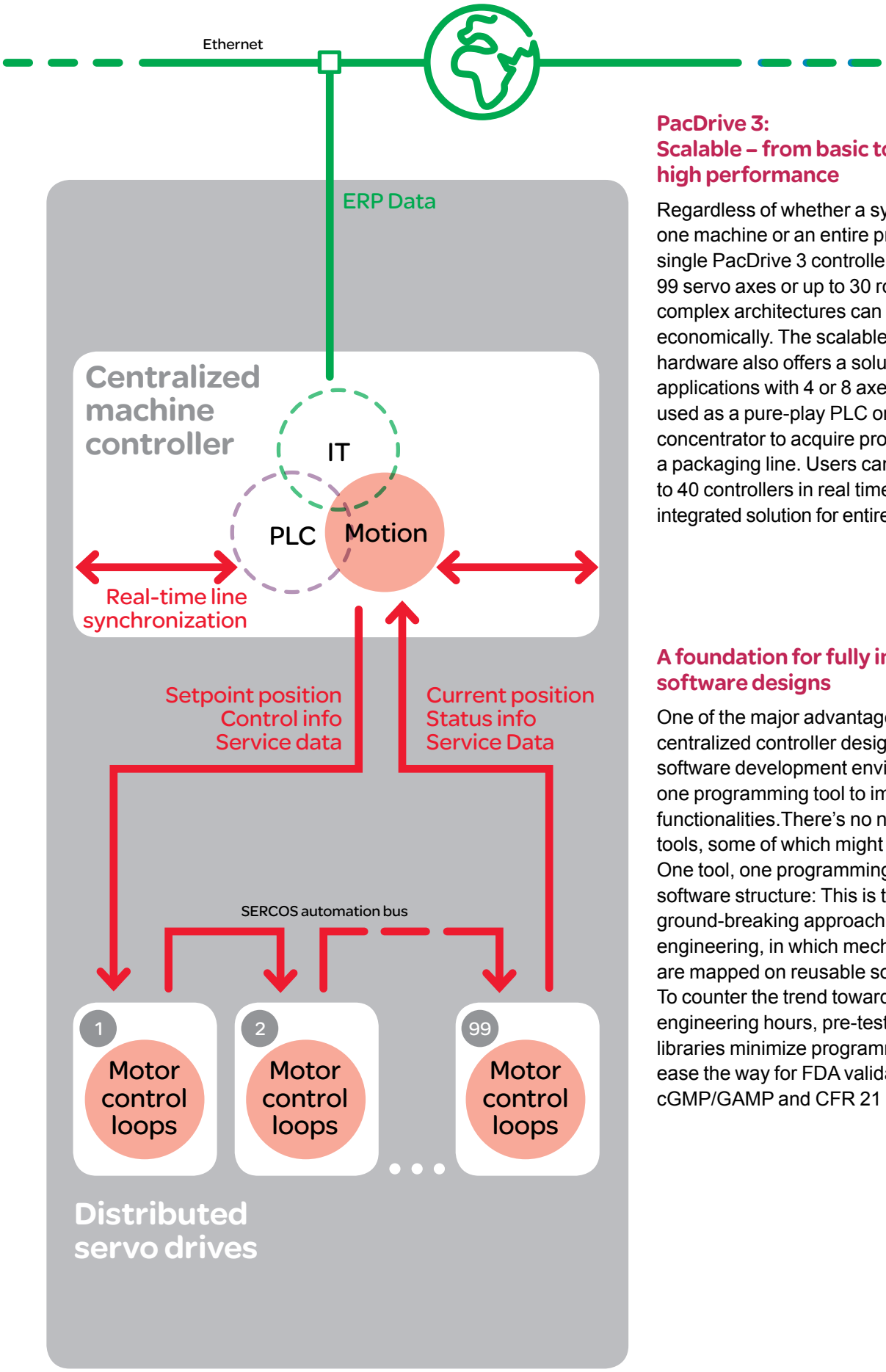
Centralized controllers for all machine functions

PacDrive's digital system architecture is based upon the concept of a centralized controller. Using an IEC 61131-3-compliant machine program, a single processor performs all control functions, from Cartesian and robotic motion to temperature regulation and machine logic. All of the system functions run through the centralized controller, from the Human/Machine Interface to motion and device bus communication, line synchronization, and vertical integration.

Basis for simulation and plug-and-play

The centralized PacDrive 3 controller generates the motion data for all servo axes in the system. It also stores all relevant system data and equipment-specific parameters. This centralized approach offers significant benefits:

- Moves can be tested and simulated in the controller without having to connect real drives.
- The controller supports reliable communication with every servo axis,including process data and motor status, which can be analyzed for different purposes.
- Servo motors and drives can also be automatically configured based upon electronic 'name plates.' The controller recognizes the motors and drives, and can send the centrally stored parameters to each device for easy commissioning or replacement.
- Configuration of individual drives is a thing of the past.



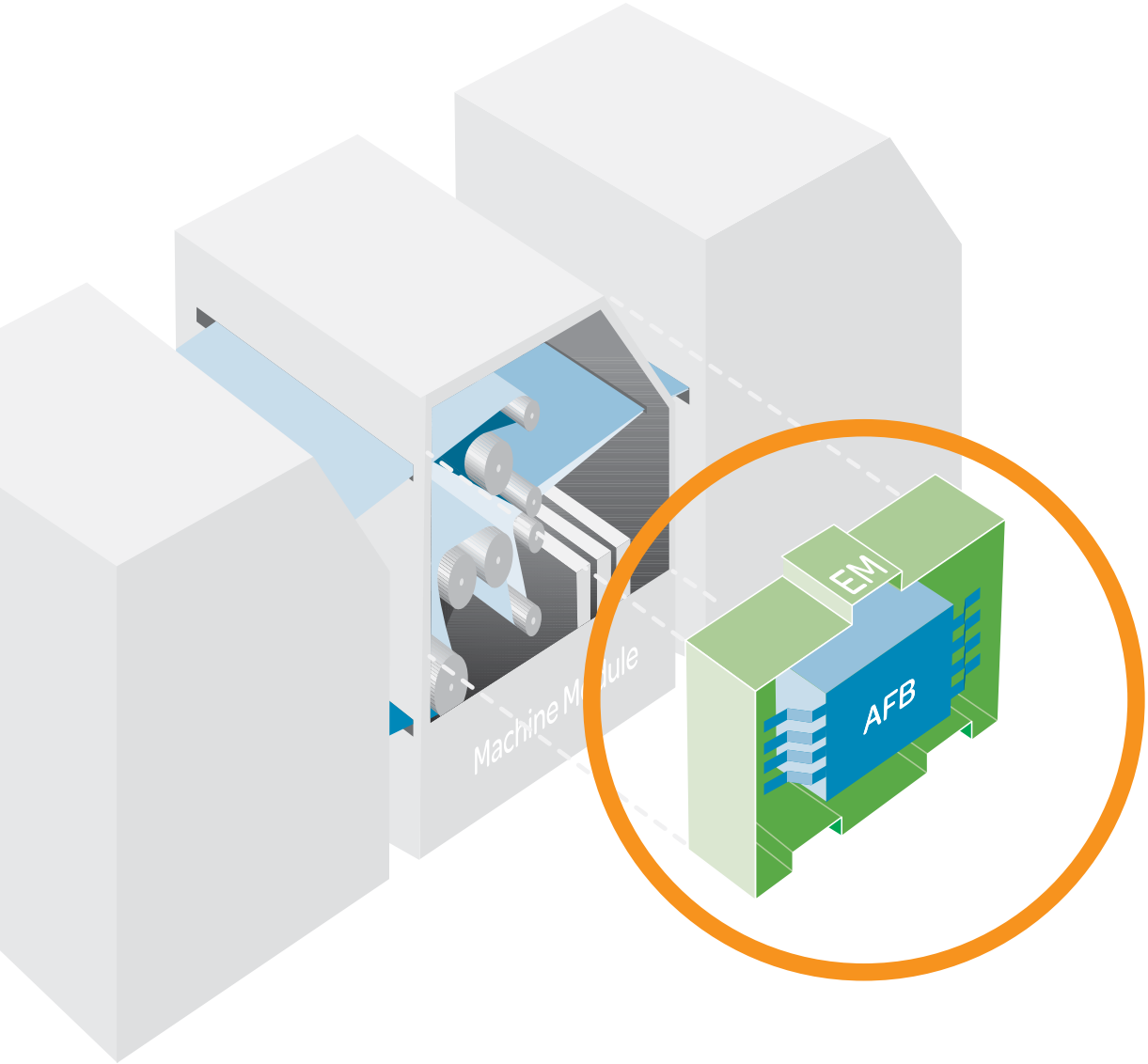
PacDrive 3: Scalable – from basic to high performance

Regardless of whether a system involves one machine or an entire production line, a single PacDrive 3 controller can control up to 99 servo axes or up to 30 robots. Even less complex architectures can be automated economically. The scalable controller hardware also offers a solution for applications with 4 or 8 axes. It can even be used as a pure-play PLC or a data concentrator to acquire production data from a packaging line. Users can synchronize up to 40 controllers in real time – a fully integrated solution for entire production lines.

A foundation for fully integrated software designs

One of the major advantages of PacDrive's centralized controller designs, is a unified software development environment, with one programming tool to implement the functionalities.There's no need for additional tools, some of which might be proprietary. One tool, one programming standard, one software structure: This is the key to the ground-breaking approach of modular engineering, in which mechatronic functions are mapped on reusable software modules. To counter the trend toward rising engineering hours, pre-tested software libraries minimize programming time and ease the way for FDA validation based upon cGMP/GAMP and CFR 21 Part 11.

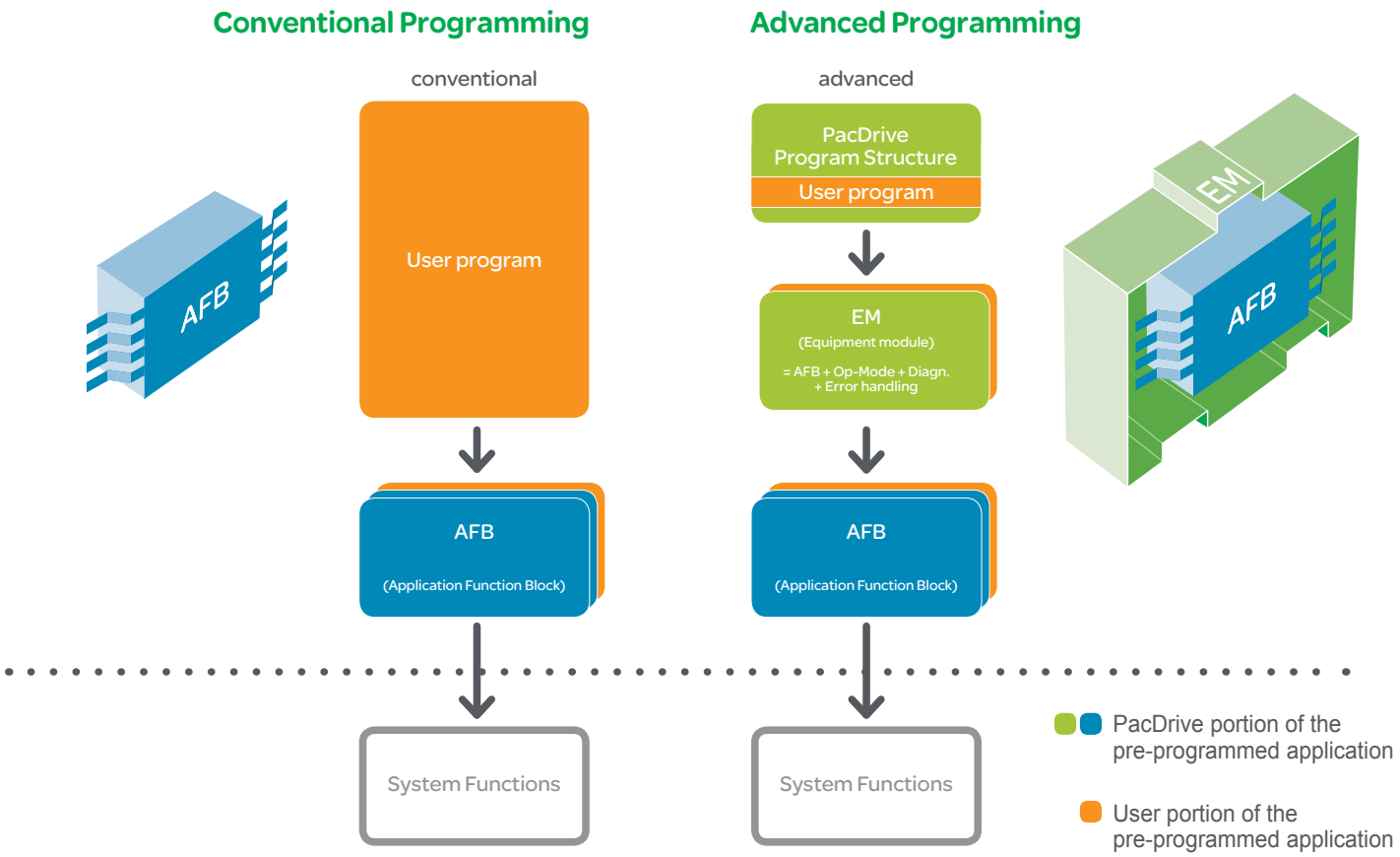
Solutions designed to reduce engineering costs...



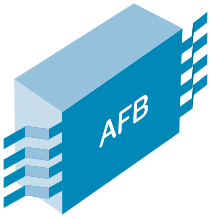
While the hardware design has to be correct, it's the software that really makes a solution work...and companies often spend more on software than on hardware. Schneider Electric's PacDrive 3 software concept provides a clear response to this development: Machine functions that have been mapped in standardized software modules and collected in software libraries serve as tested, off-the-shelf software to shorten development times and increase engineering quality. A universal program structure also paves the way for modular, reusable machine programs.

Two approaches designed to reduce engineering costs...

The Schneider Electric PacDrive 3 software concept offers two ways to reduce rising engineering costs: Programs can be programmed either in the conventional way, using Application Function Blocks (AFBs), or by using PacDrive's pre-defined program structure and Equipment Modules (EMs). The latter option further reduces programming work for the user. The program structure also creates standardized modular software that improves the reusability of machine modules.



Conventional programming with Function Blocks



PacDrive software libraries consist of Function Blocks (AFBs - Application Function Blocks), which map a variety of motion, PLC, visualization, and IT functionalities in pre-programmed software objects. These range from universal AFBs, for generating axis movements in positioning and movement functions – to temperature regulation operations. These libraries also contain Function Blocks that can be parameterized for complete mechatronic functional units, such as robots, rolling and unrolling functions, flying shear, or film sealing units.

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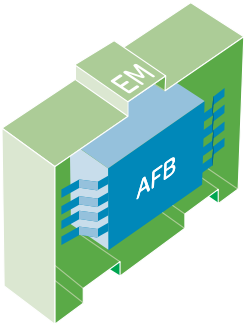
- Significant reduction in programming times
- Higher software quality with documented and well-tested programs
- Easier program validation
- IEC 61131-3 compliant AFBs

Advanced programming with Equipment Modules and programming template...



PacDrive 3's predefined programming template is a universal, basic machine program into which users can integrate their own software components. The program's basic functionalities are already in place, including OMAC-compliant operating modes, diagnostic mechanisms, and error handling and response. These can be adapted to the individual application by configuring them as needed.

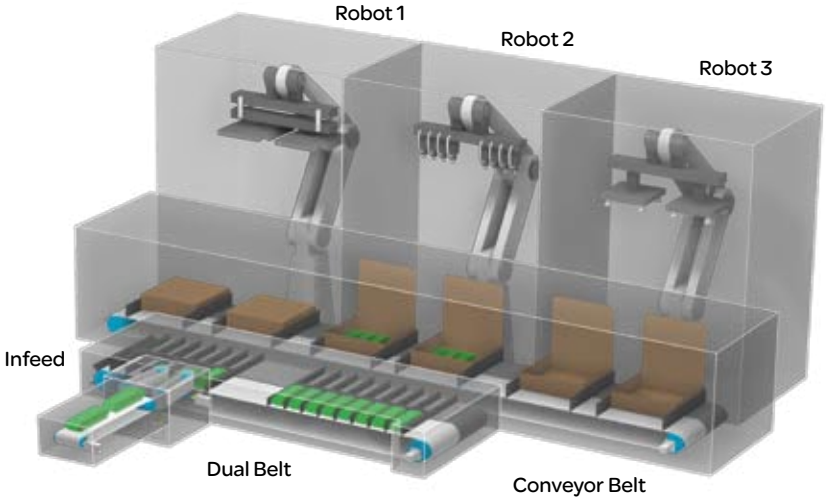
A machine's functionality can be mapped to the program by connecting the Equipment Modules. Equipment Modules are the functional equivalent of Application Function Blocks. AFBs become Equipment Modules when they are supplemented with a standardized interface, operating modes, and diagnostic functions, and sometimes with other Equipment Modules as well. They can then be used within a programming template to create a cohesive, well structured program.

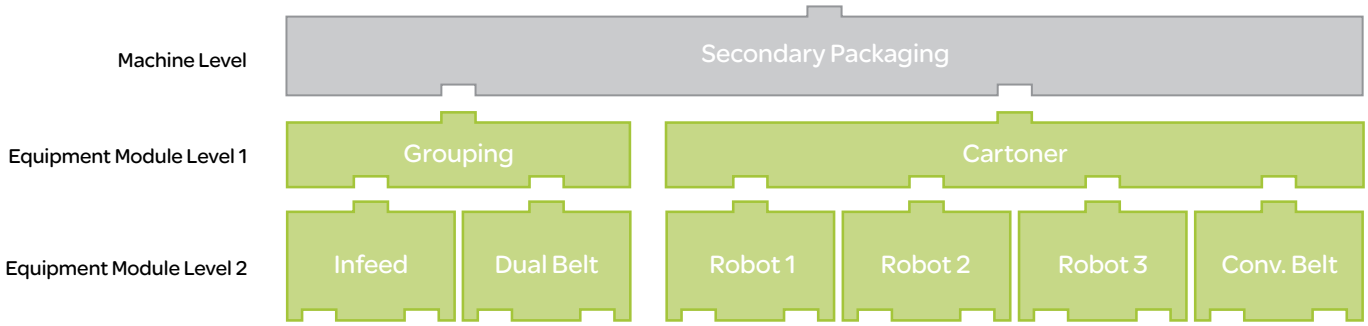
In addition to simple AFB functionalities, an Equipment Module also includes interfaces that allow error handling, diagnostics, and operating mode functions to be utilized. By subdividing the program into Equipment Modules and providing flexible linking mechanisms, the programming template permits users to separate and reuse entire machine functions.

Equipment Modules can also be individually adapted by users, e.g. to incorporate special know-how or to distinguish their machine programs from the competition.

- Reduced engineering times
- Transparent, modular, easy-to-use programs
- Basis for creating modular, customized software libraries
- Complete machine functions can be stored as reusable, standardized functions
- Compliance with OMAC and Weihenstephan guidelines for machine and line standardization

Transparent representation of the machine:
The modular program consists of Equipment Modules, whose functions can be either based on AFBs or assembled using other Equipment Modules.





Identical functions available as AFBs or Equipment Modules...

Software functions available for PacDrive 3 have been created as AFBs, or as corresponding Equipment Modules.

The libraries contain most of the functionalities needed for forming, filling, and sealing machines, dosers, cartoners, labelers, pick-and-place applications, and end-of-line packaging machines. They also offer a variety of mechatronic functions typically used in production machinery and in handling, assembly, and sorting systems.

The AFBs and EMs are documented and have been well-tested in practical use, a basic requirement for high software quality, reduced engineering time, and rapid commissioning. This also makes certification of machines and software much easier.

- Extensive Function Block libraries, including PLCopen
- Enhanced software quality thanks to off-the-shelf software (FDA, cGMP, 21CFR Part 11)

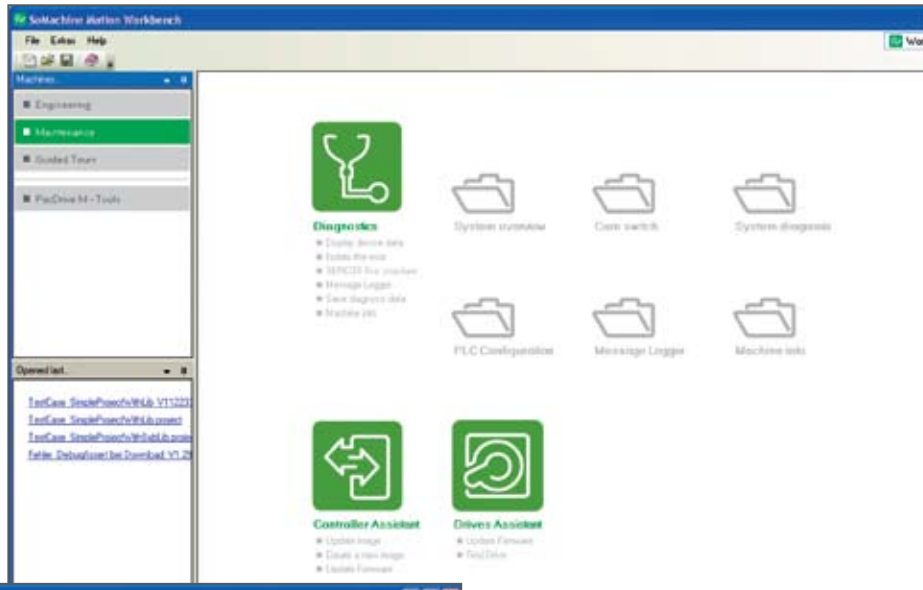
Application	Library	Included Application Function Blocks (examples)
Individual machine	PD_Template.Lib	Function Blocks for operating mode management, control of state changes, exception handling, error reaction, or predefined commissioning screens
PLC Function Blocks	PacDrive.Lib	Standard PLC functions such as bit or conversion functions, shift register for LREAL values with access functions, etc.
	FieldbusDevices.Lib	Field bus diagnostic function blocks, Function Blocks for motor protection switches or frequency converter, etc.
	System.Lib	Event-driven adjustments of any number of cam switch groups
Motion Function Blocks	PacDriveLibModules.Lib	Universal axis AFB for homing, positioning, curve functionality, jogging, etc.
	PacDrive.Lib	Safety*/Hardware, e.g. Power on and power off of axes with monitoring functions, etc.
	PacDrive.Lib	Axis and encoder positions, homing, positioning (automatic and manual), virtual master axis control, minimization of mechanical wear and tear, increase of machine speed, and reduction of energy usage with the ´Intelligent Line Shaft,´ etc.
Cam disk handling	PacDrive.Lib	Processing from table or modification of cam disk profiles on the fly, cold or warm start functions, etc.
Mathematical functions	PacDrive.Lib	Matrix operations, vector and polynomial functions or functions for toggle transformations, etc.
Technology functions	PacDrive.Lib and others	PID controller, registration mark control, winding and unwinding with and without dancer, sealing, etc.
Torque handling	System.Lib	Speed-dependent torque limit (e.g. for bottle sealing equipment), etc.
Robotics	Robotic.Lib	Automatic path planning, path generation and optimization, transformation to different kinematics, belt tracking, synchronization of robots, etc.
Infeed	MultiBelt.lib/-Module.lib	Control of dual-belt and multi-belt mechanisms for product grouping and infeed
Infeed	SmartInfeed.lib/-Module.lib	Control of serial conveyor belts as infeed lines, product detection, management, and transfer, synchronization of conveyor belts, etc.
Standardization	ISA.Lib, Weihenstephan.Lib	Weihenstephan Standard, OMAC PackML FDA
HMI application	Vijeo Designer™	Vector graphics for design, open source software, functions for machine operation, including recipe handling, sample screens, simulation/teleservice, also via Web servers, etc.
Machine Pilot programming	SoMachine™ Motion	Universally adaptable sample programming template

Description of the most important PacDrive libraries, with examples showing the scope of function. The software functions are available as either AFBs or Equipment Modules

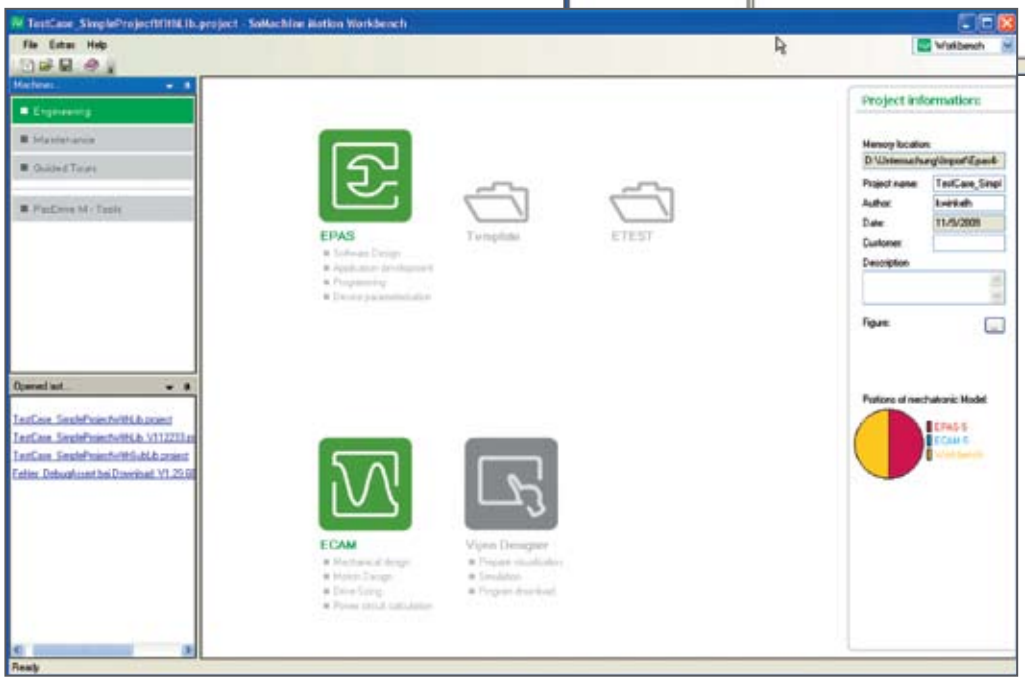
* according to IEC 61508:1998, EN/ISO 13849-1:2008

PacDrive 3 Tools: Actively shaping the modern engineering process

To keep pace with increasingly complex machine functions and designs, and the software and data that support them, engineers will have to rethink their project processes and adopt new approaches. Schneider Electric's SoMachine Motion software is the engineering workbench for PacDrive 3 applications that can help actively shape the current transformation in engineering.



SoMachine™ Motion:
A workbench with all the tools needed for the engineering process, and for service during live operation



Intuitive user interface:
The tools are structured based upon area of use (upper left), and dedicated icons allow users to orient themselves easily within the program

SoMachine Motion software Engineering Workbench

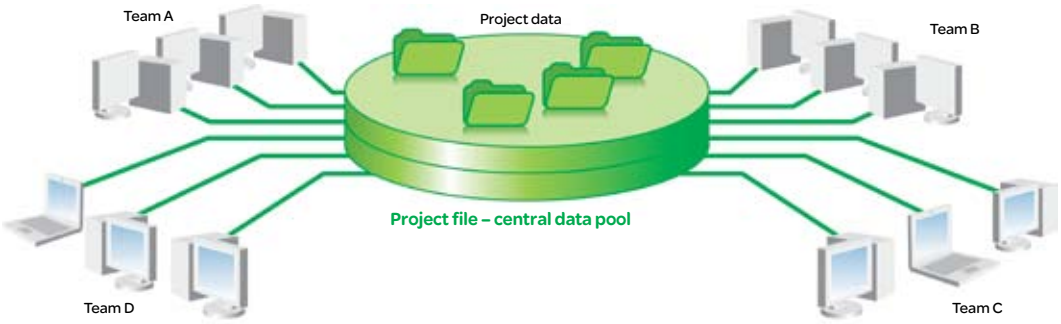
The SoMachine™ Motion workbench from Schneider Electric consolidates – in a single package – the tools needed for the entire lifecycle of a PacDrive 3 solution. This “toolkit” includes: tools for program development, HMI applications, motion design, drivetrain design, and data handling…and provides all the functionalities needed for engineering and commissioning. Users can use the integrated help system when creating programs, and the workbench’s integrated documentation can answer questions about PacDrive 3 hardware components. A powerful diagnostic tool permits rapid analysis of detected problems during production.

No need for folders full of CDs or optional tools: The necessary tools are available once SoMachine Motion is installed on the user‘s Windows PC. Selected individual tools can be installed for servicing or other purposes that require only part of the program‘s total functionality. For example, installation can be limited to diagnostic functions for servicing purposes.

Multi-user design with a central database...

Schneider Electric SoMachine™ Motion software stores all project data in a central database (project file). This data is universally accessible for all of the tools on the workbench. This central storage of project data forms the basis for SoMachine Motion's soon-to-be-released multi-user design – allowing an entire team to work concurrently on the same software project, with simultaneous access to AFBs (Application Function Blocks) and motion profiles. This reduces unwieldy version management processes and coordination tasks, that can slow down teamwork.

One project, multiple participants:
A central database and a powerful multi-user design will enable future users to have simultaneous access to software projects down to the Function Block level



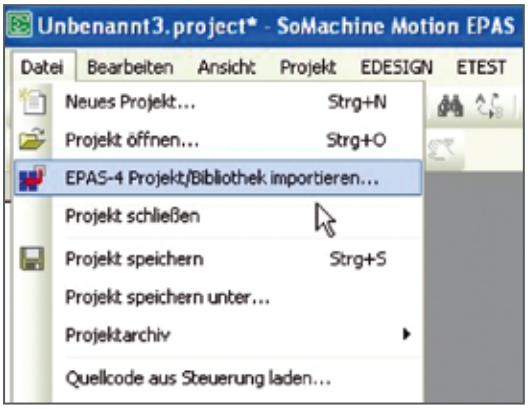
Object-oriented programming:
EPAS, the programming tool for SoMachine Motion, is based upon CoDeSys V3

Trusted open standards

SoMachine Motion can be used to create IEC 61131-3-compliant programs. SoMachine Motion's central software development tool – EPAS – is based upon CoDeSys V3, which offers the option of either traditional or object-oriented programming. Object-oriented programming has been the de facto standard in embedded and PC software development for years, and has also been a central focus of technical instruction at universities.

Continuity to preserve value

In addition to these new tools, Schneider Electric's SoMachine Motion also includes the proven PacDrive M tools. Projects created for PacDrive M in EPAS-4 can be converted for editing in SoMachine Motion, and can be ported to PacDrive 3. This idea of reducing engineering costs by producing modular, reusable software continues in the next generation of PacDrive.

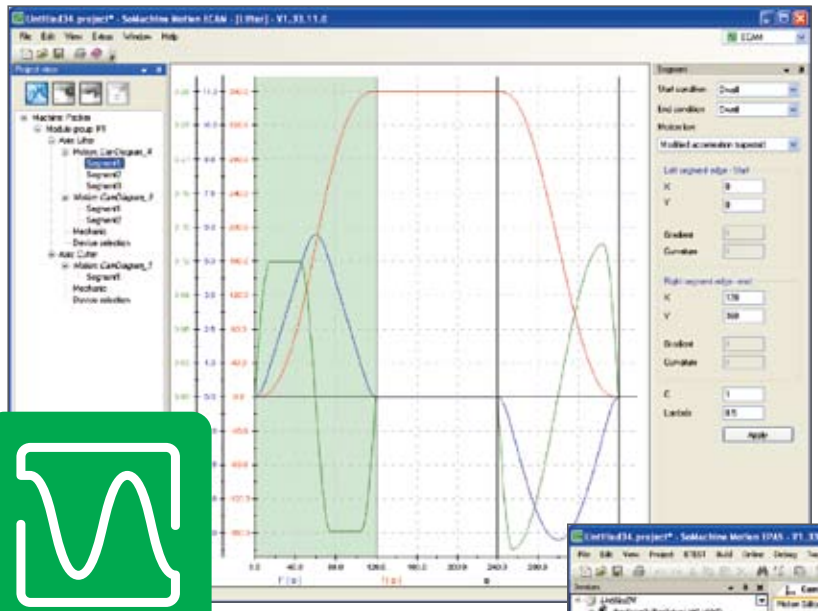


Project conversion:
Software projects created with EPAS-4 can be converted to SoMachine Motion

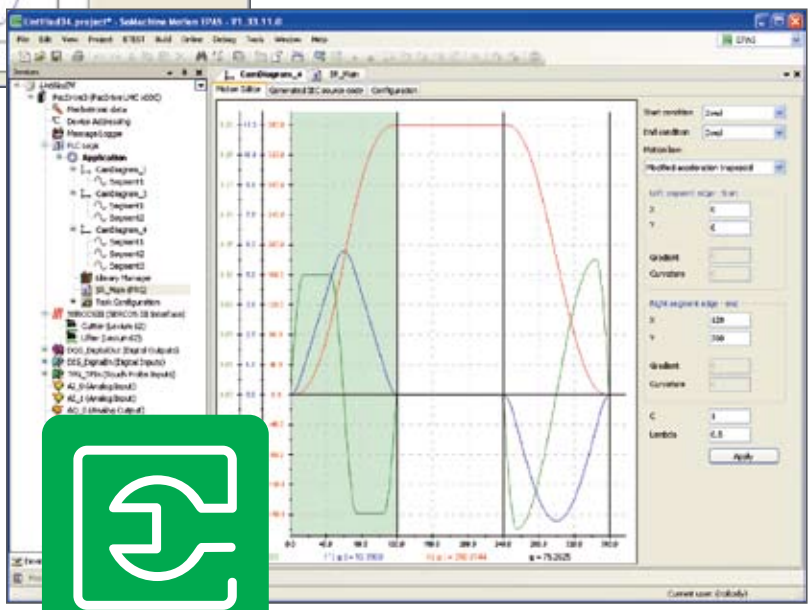
Building bridges between mechanics and software

In modern engineering, the areas of mechanics and software are increasingly involved in interdisciplinary collaboration. As the need for this collaboration grows, it requires tools to bridge these two disciplines. Schneider Electric's SoMachine™ Motion has succeeded in building just such a bridge. For example, electronic cam disks created with graphic CAM can be edited with the ECAM tool. With its emphasis on curve design, drivetrain layout, and power requirement calculation, this tool shares many similarities with mechanical drive design. Moreover, the same curves can also be processed in EPAS, the programming tool in SoMachine Motion. Both tools contain all of the necessary data, parameters, and editing functions, so that edits performed in EPAS are then available in ECAM, and vice versa.

This establishes a functional interface between both tools, which serves as a bridge for interdisciplinary collaboration between mechanical and software engineering.

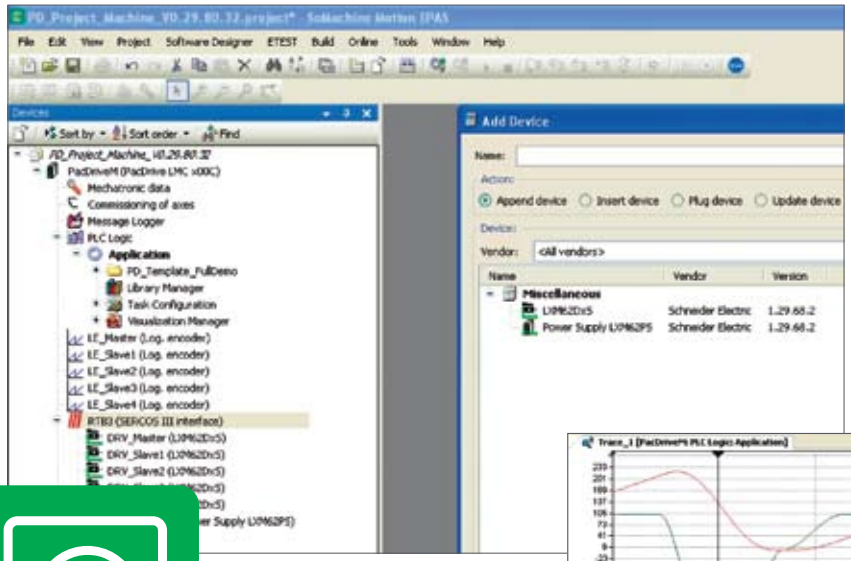


Motion design in ECAM:
ECAM is the classic tool for drivetrain design and power requirement calculation

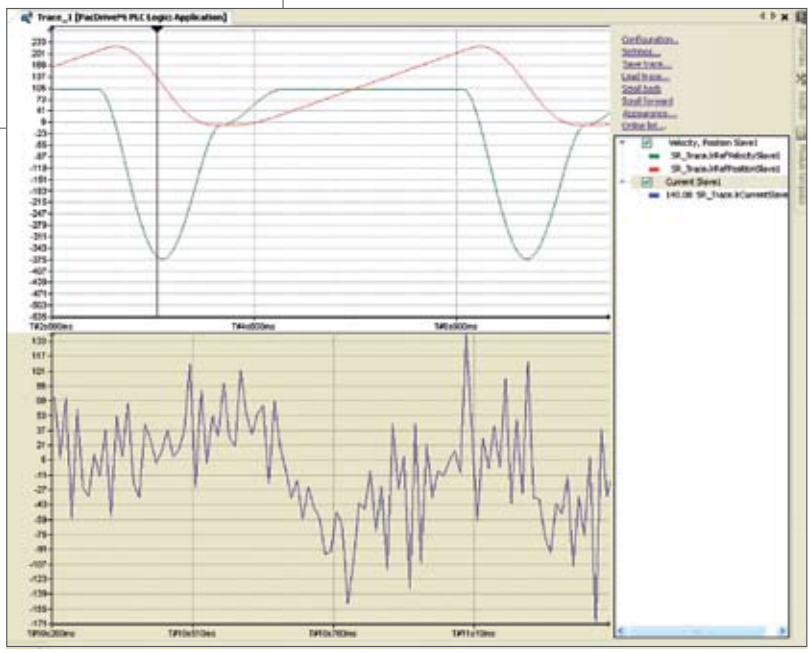


Motion design in EPAS:
The CoDeSys 3-based programming environment has been enhanced with a plug-in that adds functionalities for editing electronic curves

EPAS:
Uniform programming and parameterization

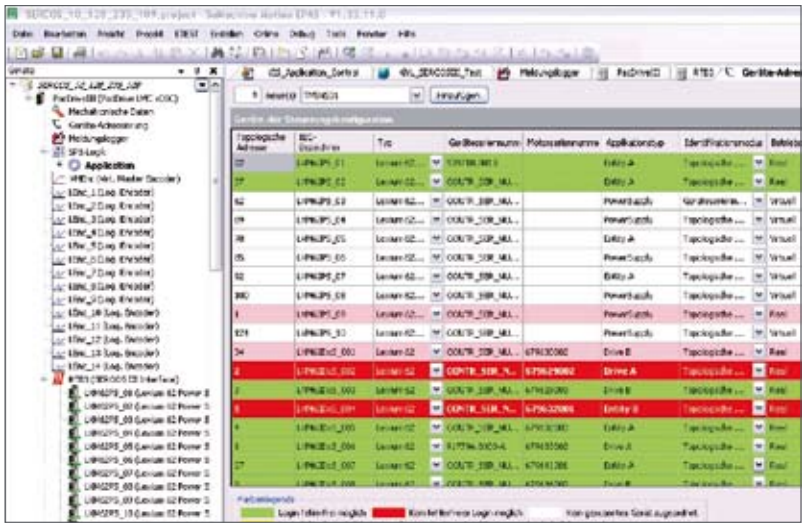


Configuration editor:
Hardware components and field buses (PROFIBUS™ DP, CANopen™, SERCOS 3) can be configured and parameterized in the editor



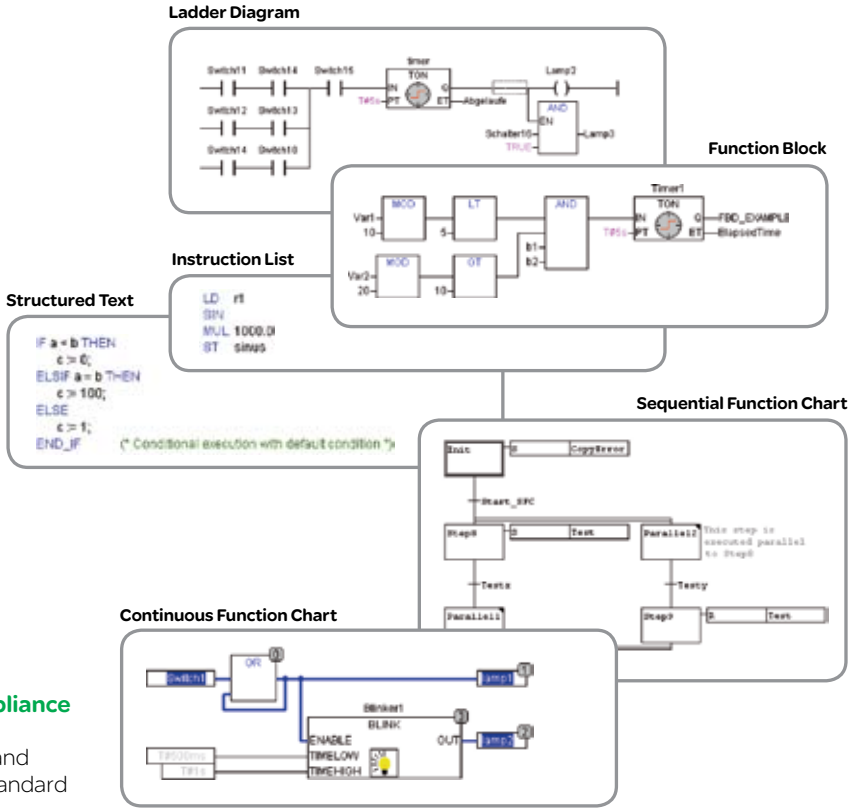
Trace Function:
The integrated oscilloscope in EPAS permits simultaneous plotting and display of multiple PLC and motion signals, as well as mixed PLC and motion signals with millisecond resolution

With its combination of advanced functionality and proven software, the EPAS Automation Toolkit from Schneider Electric is a powerful programming tool for PacDrive applications. EPAS can be run from SoMachine Motion, and its interface has the look and feel of typical Windows applications. EPAS's easy navigation between editors and within libraries provides for ease of use and transparency when creating and simulating programs and commissioning. And, EPAS functionality streamlines the engineering process. With the integrated configuration editor, a few entries are sufficient to configure, parameterize, modify, or expand the solution's hardware components and field buses – and EPAS's customizable HMI offers assistance when developing, testing, and simulating the controller application. Preprogrammed screens are already available for the commissioning process, while machine programs can be simulated onscreen – in EPAS – without real drives.



System check of device configuration:
The nodes in the SERCOS interface can be scanned, resulting in a display with status information on each node

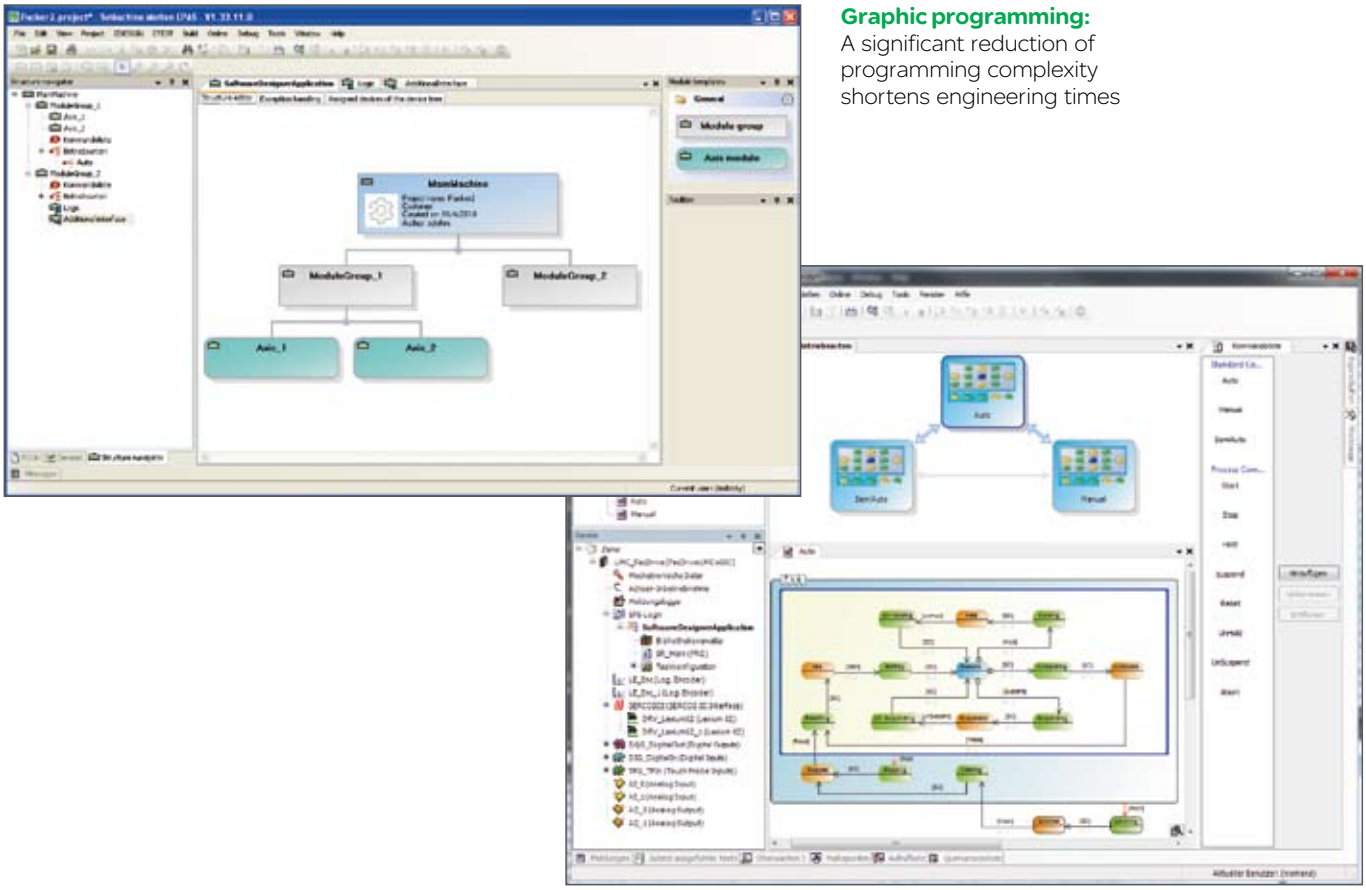
An eight-channel software oscilloscope integrated into EPAS permits simultaneous plotting of up to eight PLC and motion variables (including mixed variables). During commissioning, the tool's message logger makes it easy to track down the source of system and user diagnostic messages. EPAS Automation Toolkit can be used with all models of the PacDrive 3 Controller. No conversion is needed to download programs to different controllers.



Programming in compliance with IEC 61131-3:
EPAS includes editors and debuggers for all six standard IEC languages

- Uniform programming and parameterization
- Program simulation without real axes
- Hardware configuration and parameterization without the need for additional editors
- Visualization tool with pre-programmed commissioning and service screens
- Simultaneous trace plotting of PLC and motion signals (software oscilloscope)
- Diagnostic functions, including message logger
- IEC 61131-3 editors
- CoDeSys V3-based

EDESIGN:
A revolutionary new form of graphic programming from Schneider Electric



Graphic programming:
A significant reduction of programming complexity shortens engineering times

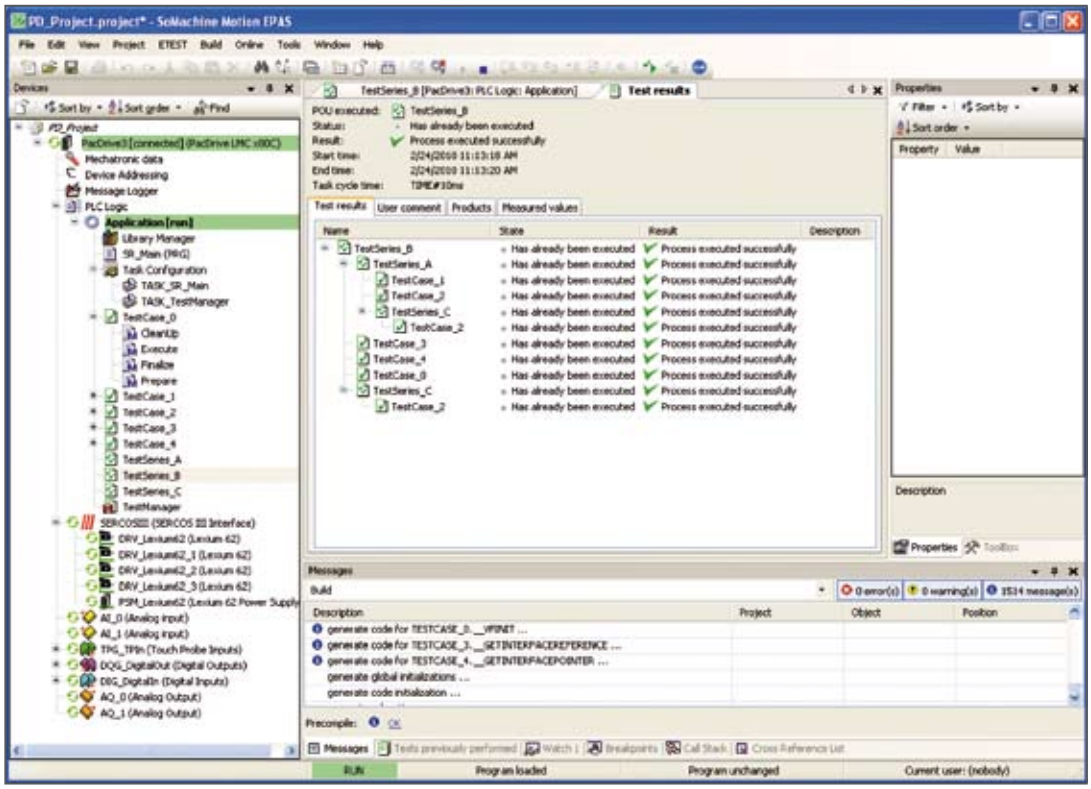
At Schneider Electric, efforts to further reduce programming complexity and an emphasis on modular software are producing completely new approaches for the creation of machine programs. The result is EDESIGN.

Using a structure editor that allows easy assembly of a complete machine, using a drag-and-drop function to select predefined modules…together with other editors using command lists to define operating modes and state diagrams…EDESIGN tools provide virtual graphic programming. With commissioning and debugging being performed directly in these editors, exception handling and operating mode management is radically simplified.

The results are clearly structured configurations in which predefined modules, e.g. a servo axis, can be configured with easy dialogs. Movements can be integrated directly from ECAM. And, hardware is assigned to the modules by means of selection fields with dialogs to assist the user.

EDESIGN: Innovative simplicity for your complex machine design.

ETEST:
For developing and executing system tests of modular machine programs...

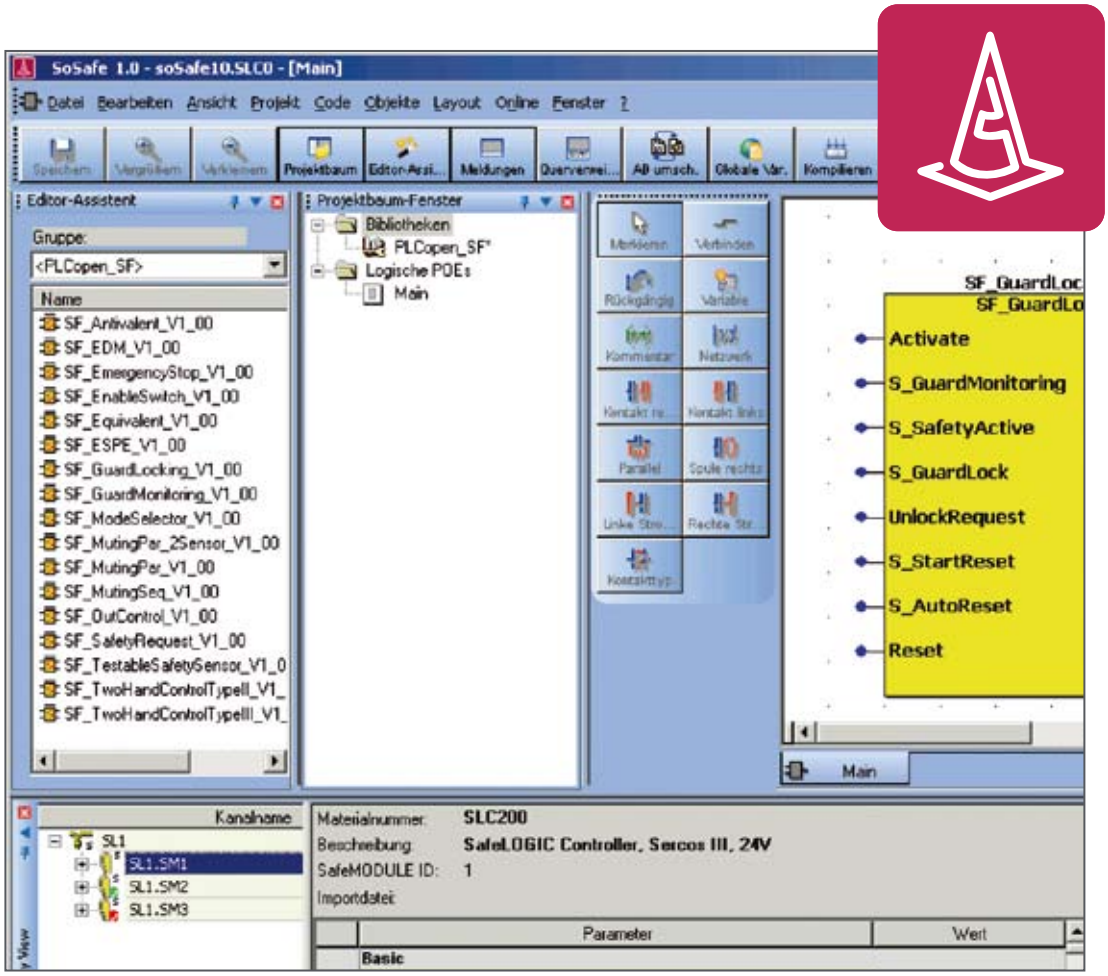


Early detection of software problems: ETEST is the tool for creating and performing automated software tests

PacDrive 3 libraries have AFBs (Application Function Blocks) that can be parameterized for a variety of mechatronic, mathematical, and technical process functions. The ability to create programs based upon years of proven and documented off-the-shelf software not only saves time, but also significantly improves software quality. In addition, Schneider Electric's SoMachine™ Motion ETEST tool is used to develop and execute system tests of modular machine programs. By using test routines that automatically test isolated software modules within a program, software problems can be identified, even at an early phase of the project. These module tests are a valuable component of the software validation process. ETEST fully performs this valuable function.

SoSafe

Safety Editor* and Configurator for safety automation...



IEC 61131-3-Editor: The programming languages Function Block Diagram (FBD) and Ladder Diagram (LD) can be used to develop the program code

The integration of safety automation into standard automation is a critically important user requirement. Schneider Electric's PacDrive 3 SoMachine™ Motion software SoSafe includes an editor for safety automation. And, the creation of IEC 61131-3-compliant programs for PacDrive safety controllers is as integral to the workbench as the parameterization of system component safety functions. In addition to the program editor, the SoSafe tool also has a configuration editor that can be used to parameterize components such as I/O components or servo drives that are integrated into the safety solution.

* according to IEC 61508:1998, EN/ISO 13849-1:2008

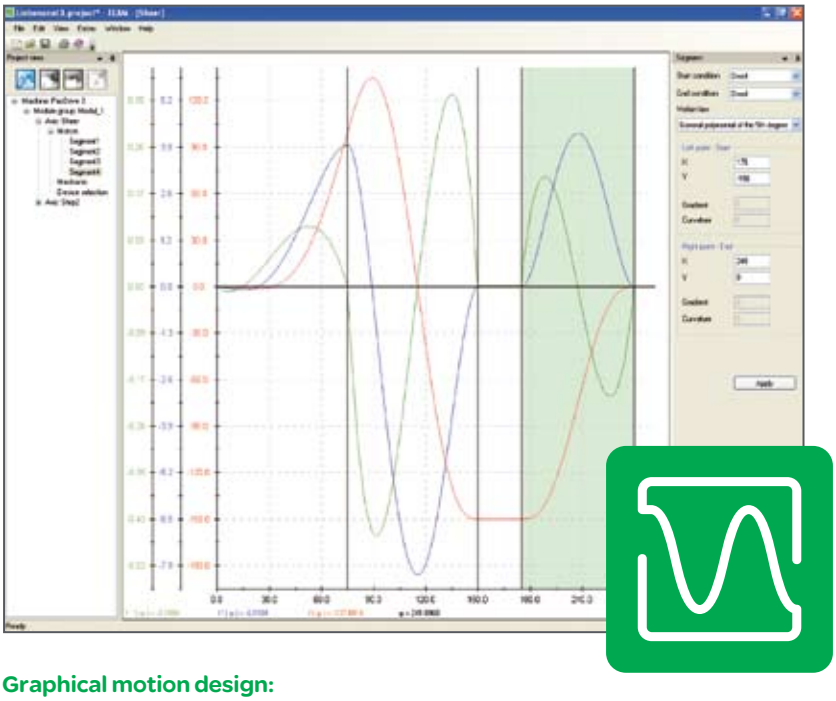
ECAM

Motion and drivetrain design tool...from Schneider Electric's PacDrive 3 SoMachine Motion software

ECAM is a single tool that can be used to design a complete system, from mechanics and motion design to calculation of system power requirements. To streamline the engineering process, ECAM includes a library of predefined standard mechanical drive configurations, simplified motion design – with a graphical motion profile editor – and standard motion profiles.

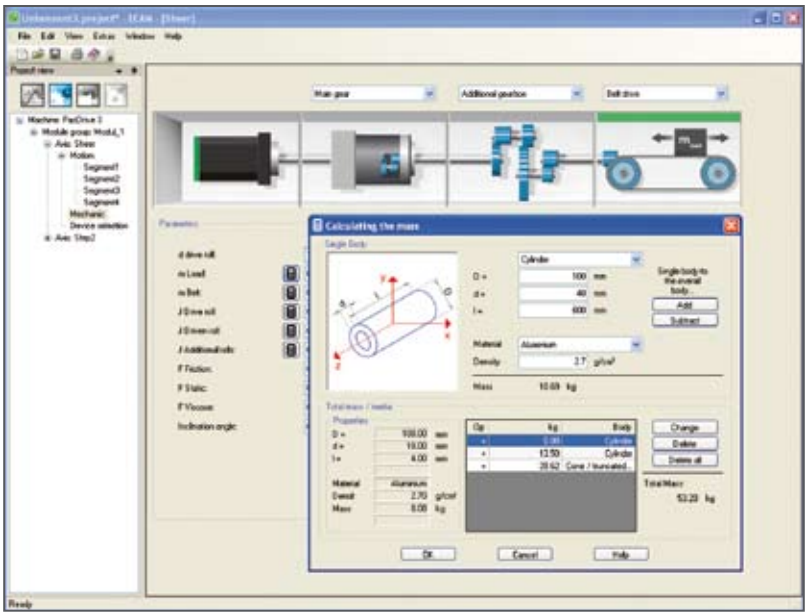
This makes ECAM a functional tool for mechanical engineers in designing and selecting motors, gears, and power components. Tools for calculating power requirements and determining the energy available from the DC bus also help in developing energy-efficient machine designs.

A seamless, bidirectional interface allows curve data and mechanical parameters to be automatically provided to EPAS – the SoMachine Motion programming tool. Data can be adapted in EPAS and are then immediately available again in ECAM – a bridge between mechanics and software.



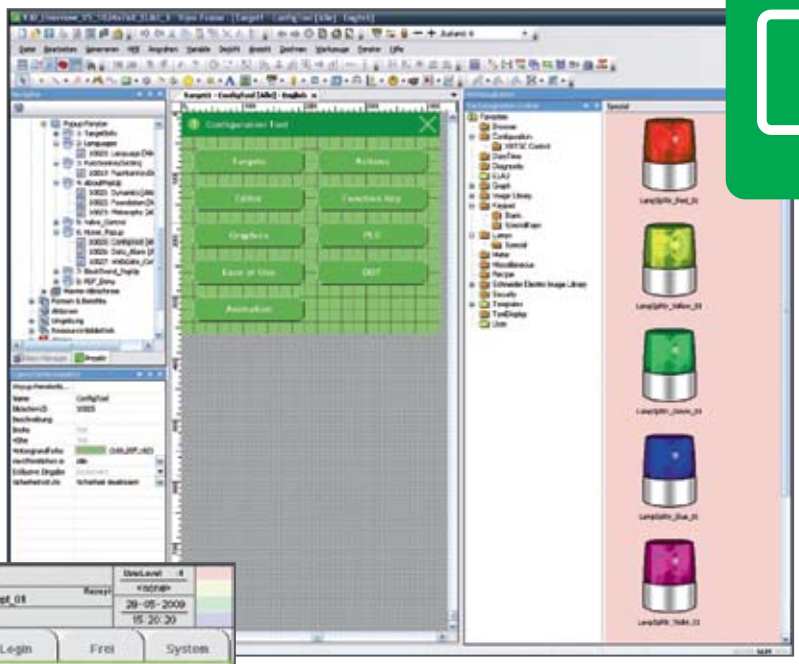
Graphical motion design:
By cascading editor windows, users can place movement patterns in chronological relationship to one another

Drivetrain design:
Predefined applications offer adaptability for typical power transmission configurations



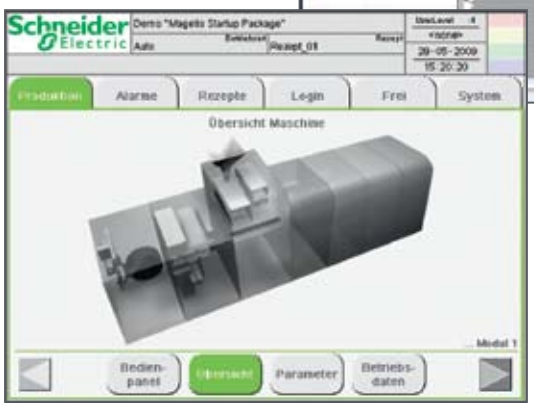
- Motion design with virtual or real master axes
- Use of multi-segment profiles, such as VDI 2143 profiles or fifth order polynomials
- Import of cam tables via Excel tables
- Database for servo motor/drive and gear reduction sizing and selection
- Predefined applications such as general loading condition, belt drive, spindle drive, rack-and-pinion drive, and crank drive

Vijeo Designer™
Customized design of Human/Machine Interfaces



Vijeo Designer:
A large number of predefined elements, graphics libraries, recipe and alarm management functions, and an easy-to-modify suggested schematic make HMI development fast and easy.

- One tool for all panels
- Predefined functions and graphic elements provide design support
- Fast solutions with open-source sample program
- ARTI driver for browsing control variables without an OPC server



Open-source software included:
A suggested schematic diagram is easy to modify, simplifies the learning process for Vijeo Designer, and produces fast results

Schneider Electric's Vijeo Designer software can be used to configure all Magelis™ touchscreen panels, from the smallest 3.8" panel up to complex HMI applications for the 19" panels. This tool set also includes the ARTI protocol driver that allows users to access runtime system variables via the browser. The tool's graphical editor provides a number of ready-made elements for customizing HMI interfaces. And, the graphics library has more than 4,000 predefined vector graphics. An integrated recipe maintenance program manages 256 recipes with 1,024 ingredients in up to 32 recipe groups, and users can perform periodic or event-driven processing of Java-based procedures to automate operations, including: switching screens, performing mathematical and logical calculations, and making automatic changes in variables. Also, Vijeo Designer's alarm management system is designed for up to 9,999 alarms.

Controller Assistant and Drives Assistant

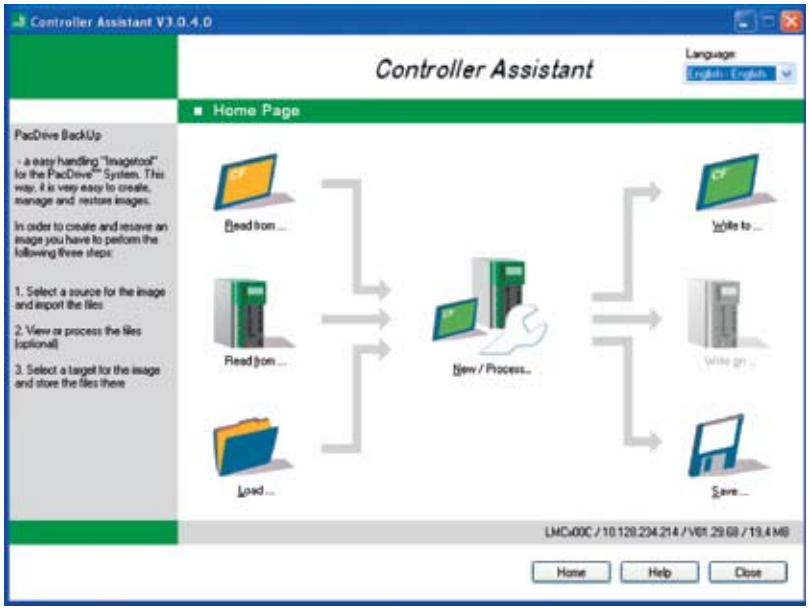
PacDrive 3 tools for data management

Schneider Electric's PacDrive 3 support tools make it easy for PacDrive users to handle program and firmware data and to perform program version management.

The **Controller Assistant** stores data and files on the flash drive and creates a copy on the user's PC. If necessary, this copy can be used to restore the program to original status. The tool's functions also include the creation of CompactFlash cards for PacDrive controllers (including bootable cards). These cards include the VxWorks operating system and firmware.

The Controller Assistant supports firmware exchanged between PacDrive controllers via Ethernet. If a user wants to check a network for existing PacDrive controllers, the Controller Assistant can identify connected controllers and display their identifying data.

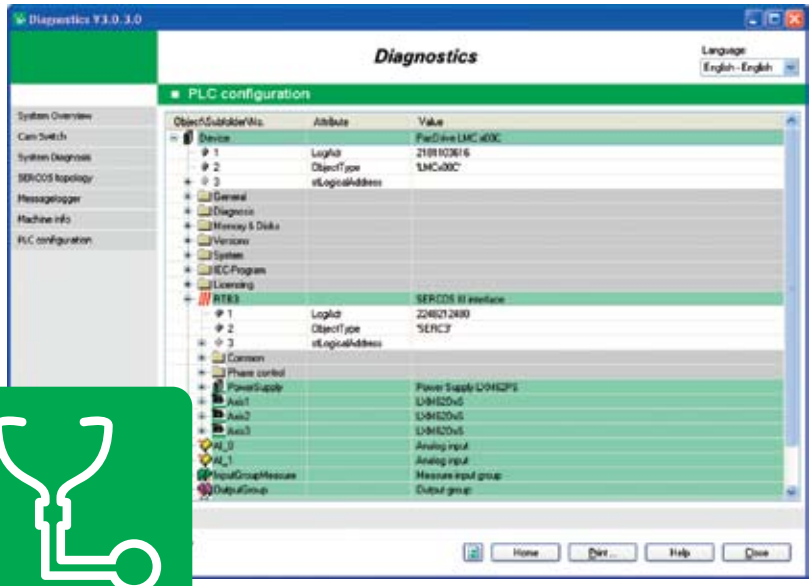
The **Drives Assistant** allows the maintenance and exchange of firmware on SERCOS nodes. Servo drives, bus interfaces, and even TM5 I/O modules can be easily supplied with new firmware from a central location. The integrated management of firmware versions optimizes their storage and retrieval.



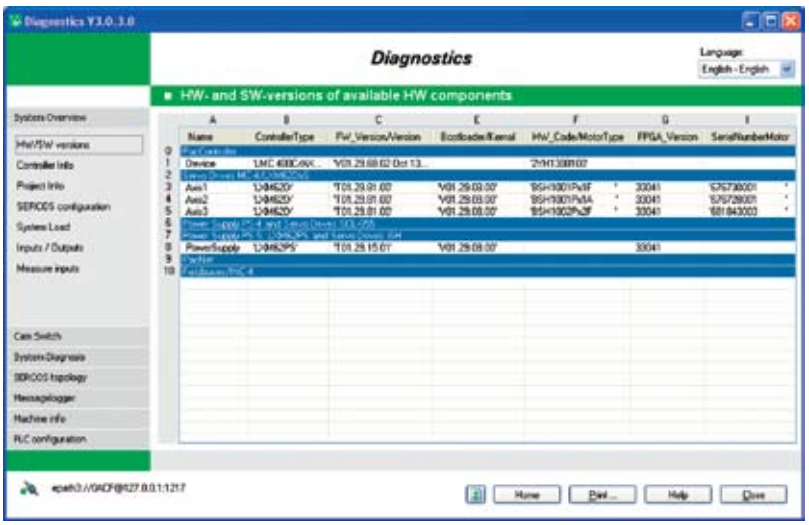
Data management:
Tools make it easier to transfer and handle program and firmware data. This screenshot shows the Controller Assistant

Diagnostics

PacDrive 3 maintenance without EPAS



Diagnosis of machine malfunctions:
Diagnostics can be used to perform comprehensive system diagnostics even without programming knowledge. The screenshot shows a check of the PLC configuration.



System check:
Diagnostics can be used to check the hardware and software versions of the servo drive components on the PC

- Simple tool for collecting service-related system data
- No EPAS required
- Firmware-independent
- System map of servo drive data (drives, message loggers, cam switch group)
- Intuitive user interface

EPAS – SoMachine Motion's programming language – integrates comprehensive diagnostic functionalities, but is not always available if a machine breaks down during production. This is why PacDrive Diagnostics was developed specifically for use by machine operators for servicing purposes. This tool offers a full range of diagnostic functions, runs independently of EPAS, and is available at no cost to PacDrive users. It also can be used without any programming knowledge, since the intuitive program interface allows users to quickly collect the necessary servicing data. Diagnostic information is displayed upon demand, stored, or forwarded directly to technical support, and the tool can be used regardless of the firmware version.

PacDrive 3: Complete online documentation

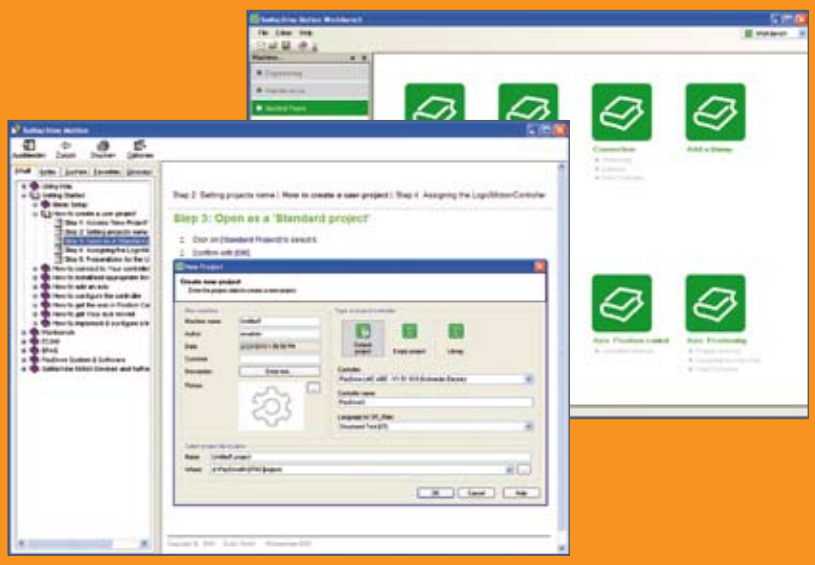
Schneider Electric knows that even with intuitive tool interfaces, sometimes you need help. From your first steps with SoMachine™ Motion to routine project work...experience has shown that support is most useful when it is available right on screen. In SoMachine Motion, "Guided Tours" familiarize users with tools, while electronic documentation on tool and library functions make printed manuals unnecessary.

- Guided Tours – Help for beginners, including an interactive demo project
- Keyword search in the documentation via the Index function
- Search for topics using content directories
- Extensive documentation of library functions

Guided Tours through SoMachine Motion

Guided Tours are an easy way to learn how to use SoMachine Motion. Each tour addresses different topics and/or learning objectives. The Guided Tours are listed in an overview, and can be started from there. Each tour completely covers a given topic and consists of a number of easy-to-follow (and illustrated) steps. Users can move back and forth between the steps, and can proceed through them at their own speed. Each Guided Tour also includes a demo project, with the demo project and the step-by-step instructions in the Help files displayed side-by-side. With the demo project, users can practice the steps explained in the Tour. The demo project already contains all of the Function Blocks required for performing the demonstrated instructions from the Guided Tour, and users have access to appropriate editors, which are already opened for this purpose.

"Guided Tours" are closely linked with other Help components. Individual steps are linked not only with each other, but also with relevant information in the normal Help files. This makes it easier for users to explore the topics addressed in even greater depth if desired.



"Guided Tours" through the tools help users get started with SoMachine Motion

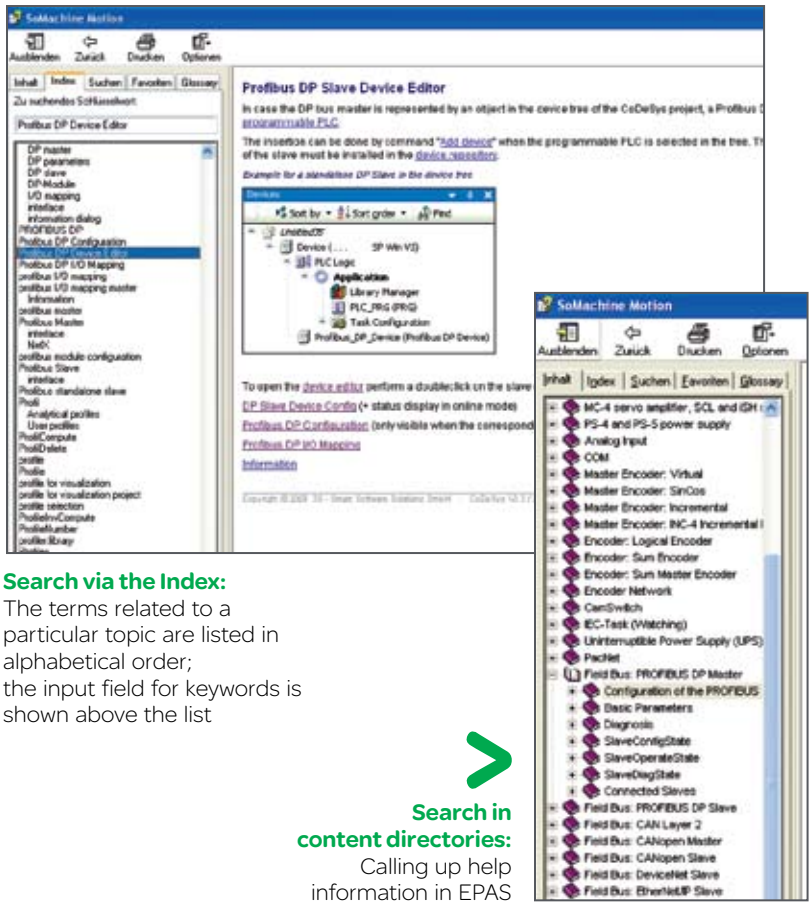
PacDrive 3: Electronic Documentation – the paperless manual

The tools, particularly EPAS and ECAM, offer comprehensive documentation for users. This wide array of systematically recorded information can be accessed by keyword search, and provides comprehensive technical background information and instructions on using the tool. Unlimited availability of the "E-Documentation" makes it unnecessary to keep a hardcopy manual next to the keyboard.

Schneider Electric's SoMachine Motion tools are largely intuitive in their operation. The Help function for each tool provides answers to more detailed questions on operation, or on the technical and mathematical background of the available functions. As with typical Windows applications, the Help function can be started with the click of a mouse.

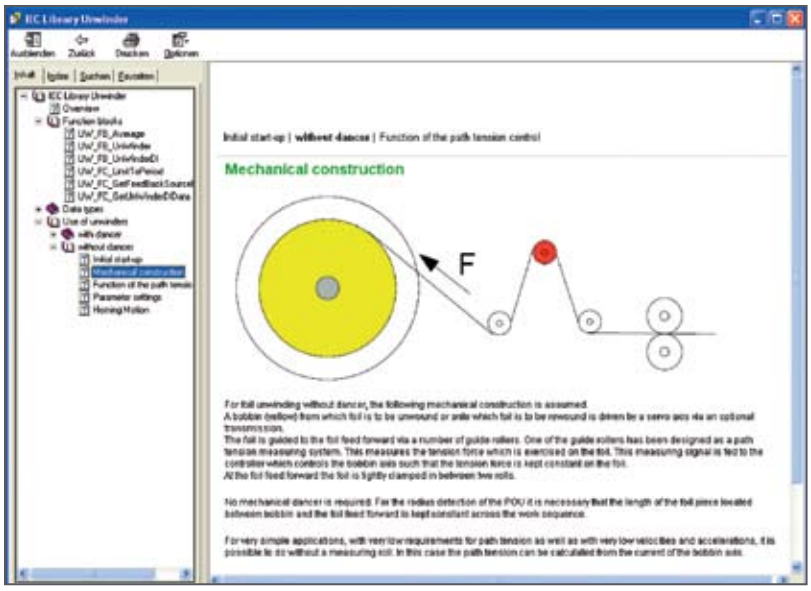
EPAS E-Documentation offers two ways to access information: via a table of contents listing topics contained in the E-Documentation…or, users can also use the Index to search alphabetically for available topics. A search algorithm limits the content that is displayed.

On-screen documentation is also available for library Function Blocks, with technical background, scope of functions, parameterization, and integration of each function described in detail. Integrated hyperlinks in the explanations let users jump to other sections of the documentation for more detailed explanations of specific terms.



Search via the Index:
The terms related to a particular topic are listed in alphabetical order;
the input field for keywords is shown above the list

Search in content directories:
Calling up help information in EPAS



Documentation of library Function Blocks:
The image shows the table of contents and one page from the library Function Block for implementing wrapping mechanisms with and without a dancer

Scalable controller performance

The PacDrive 3 LMC 101C, 201C, 300C, 400C, and 600C automation controllers cover a wide range of applications. Variables including: the number of axes to be synchronized, data transmission volumes, and the range of robotic elements to be integrated – all determine which controller offers the optimum balance of price and performance.

LMC x01C and x00C Series controllers: Scalable controller performance for cost-effective automation solutions.

A single platform for all controller functionalities

PacDrive 3 LMC x01C and x00C controllers provide scalable performance for synchronizing up to 99 servo axes (at 1 msec network update rate for 99 axes), and for up to 255 virtual axes. In addition to motion functionality, all controllers combine an integrated PLC, HMI, and IT functionalities on a single hardware platform. They are software-compatible, since each of these controllers has identical Schneider Electric Logic Motion Runtime software, and users can program up to 4096 dynamic electronic cam disks operating in parallel. The program can switch between electronic cam disks during operation, and control can be distributed across a number of continuous, periodic, or event-driven user tasks.

Each controller has two integrated cam switch groups, each with 32 cam disks. The system can allocate up to 254 cams, with up to 32 different positioning or encoder signals assigned to each of the two groups. Cam signals can be routed to a memory cell or to a digital output.

Depending upon the controller type, memory can be up to 512 MB DDR2 RAM, or 128 or 256 KB NV RAM, with additional compact Flash memory of 128 MB or more. The memory card can be changed out without removing the enclosure, as can the battery. An alphanumeric display shows diagnostic data, and the controllers include an integrated eight-channel software oscilloscope and a message logger for diagnostics. All controller types are CE and cULus certified.

Functional:
The compact Flash memory card behind the display contains all of the software that needs to be transferred when replacing the controller

- A scalable controller platform
- One runtime software
- All controllers are software-compatible
- Ethernet-based, fully integrated automation bus
- Can control up to 99 real axes and another 255 virtual axes
- Up to 254 SERCOS 3 nodes
- 1 msec network update rate for 99 axes
- Up to 4096 electronic cam disks can be switched during operation
- 5 µsec for 1000 bit instructions
- Integrated plaintext display for system messages
- Integrated software oscilloscope and message logger

Integrated I/Os – externally expandable

PacDrive 3 LMC x00C controllers can use integrated, digital and analog I/Os to communicate with a variety of sensors and actuators directly, without being redirected through field busses. Controllers include both standard and high-speed I/Os (touch probes) that allow significantly faster responses to events (such as motion-relevant signals) recorded by sensors. External I/Os can also be added.

Interfaces and communication

SERCOS 3 is the PacDrive 3 automation bus for servo drive and field communication, as well as for safety communication*. Real-time and standard Ethernet interfaces are also standard. The standard Ethernet connection serves as an interface to the engineering system and the HMI via OPC, ARTI, or Modbus™ TCP, and as an open interface for customized communications solutions.

All Schneider Electric PacDrive controllers also have a CANopen™ interface, and the LMC x00C controllers have a PROFIBUS™ interface (master and slave) as well. In addition to communication via SERCOS 3 and Ethernet, LMC x00C controllers can also simultaneously communicate via two field bus protocols and real-time Ethernet, e.g. CAN and Profinet™. Optional expansion cards are also available for all controllers to implement additional field bus interfaces, such as EtherNet/IP.

USB and serial interfaces are also standard in all controllers. The serial interface can be configured as an RS 232 or RS 485 interface.

Performance overview: All LMC x01C and x00C Controller types

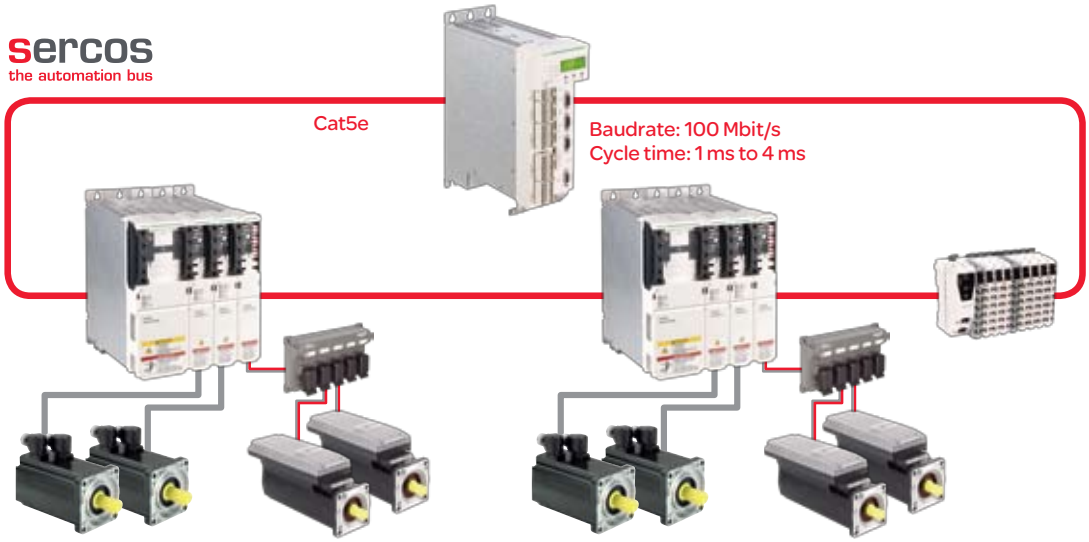
	Controller type PacDrive LMC	101C	201C	300C	400C	600C
Availability		Immediately				
Motion Performance	Maximum number of synchronizable axes/network update rate (1 msec)	4	8	8	16	99
	Number of dynamic electronic cam disks operating in parallel	4096				
PLC Performance	Time required per 1000 bit instructions [µsec]	5				
	Programmable dynamic cams	254				
	Cam cycle time [µsec]	250				
	Number of user tasks, continuous, periodic, or event-driven	Any number, within the system limits				
	Fast task network update rate [µsec]	250				
Communication	Integrated motion bus	SERCOS 3 interface				
	Integrated Ethernet connection	10/199 Base-T		10/100 Base-T		
	Number of integrated field bus interfaces	1, CAN		2 (3), PROFIBUS DP, CAN oder EtherNet/IP		
	Number of optionally integrable field bus interfaces	1		2, PROFIBUS DP, CAN oder EtherNet/IP		
Housing dimensions	Width x Height x Depth [mm]	45 x 230 x 220		104 x 270 x 240		

Subject to change without notice

* according to IEC 61508:1998, EN/ISO 13849-1: 2008

SERCOS 3 Automation Bus

SERCOS 3 is the universal automation bus for PacDrive 3. Drive-based communication, I/O communication, and safety communication* can be implemented using the same medium.



Vendor-neutral

With IEC 61491, SERCOS established itself as the worldwide communication standard for automation. SERCOS 3 uses industrial Ethernet for its transmission physics. More than 50 controller manufacturers and 30 drive manufacturers worldwide support the standard.

Powerful

Greater bandwidth makes SERCOS 3 even faster than SERCOS 2. This allows a network update rate of 1 msec for up to 99 drives. An innovative synchronization procedure makes SERCOS 3 even more precise than before.

Universal

The use of standardized profiles for drive technology, I/O, and communication between controllers (C2C) increases the range of possible applications for SERCOS 3. For the first time, SERCOS can be used as a fully integrated Ethernet-based solution for drive and field bus communications, including communications in safety automation*. SERCOS 3 also permits parallel transmission of standardized or proprietary IP protocols over a non-real-time channel.

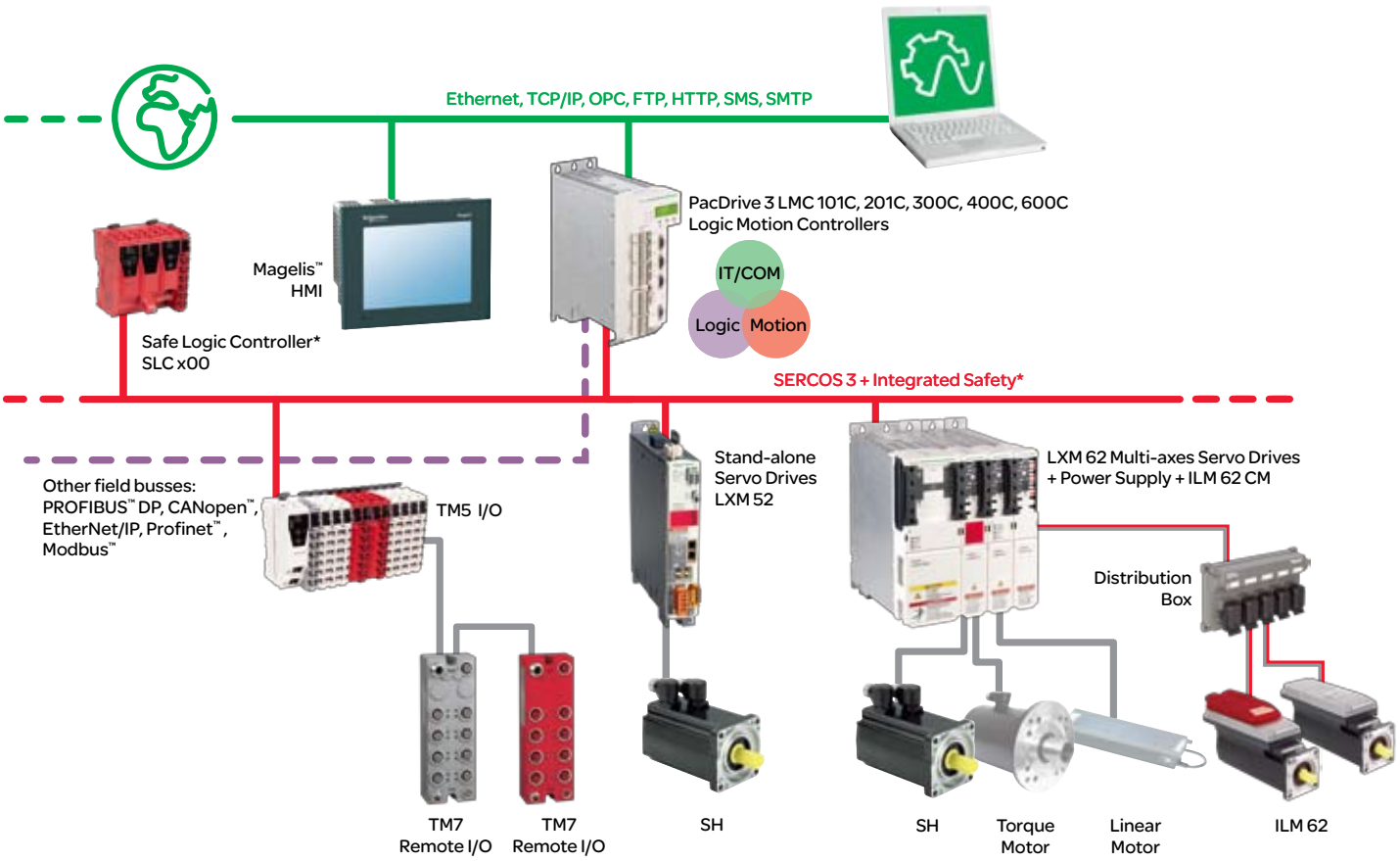
- Bidirectional full-duplex Ethernet communication
- Media redundancy to reduce failure probability
- Simpler, more cost-effective design
- No hubs or switches
- CAT5e cable is generally sufficient
- Complete setup via software, including assignment of bus addresses

* according to IEC 61508:1998, EN/ISO 13849-1: 2008

Safety functions* for the entire machine

With Schneider Electric's PacDrive 3 system, standard communication and safety communication* are completely integrated, and SERCOS 3 is the shared basis for communication. Components for safety* signal acquisition and safety* dialog (page 72) can also be integrated into the safety solution* using safety I/O components (page 46).

* according to IEC 61508:1998, EN/ISO 13849-1: 2008



Complete integration...

A safety protocol via SERCOS 3 enables the complete integration of safety communication into standard communication, without the need for additional dedicated cabling or a safety bus. Safety signals from data acquisition or dialog devices are connected through safety terminals or remote I/Os, while a safety controller on the SERCOS 3 ring permits programming of the safety functions. Both standard safety functions and safety functions enhanced in accordance with PLC Open Safety definitions can be implemented with the integrated solution.

Schneider Electric's SoMachine™ Motion Workbench is a programming tool for the engineering functions. In addition to the program editor, it also contains tools to set the safety device parameters for functional safety components (drives, I/O components). Also, the Safe Logic Controller can be programmed directly via the PacDrive controller, which functions as a gateway.

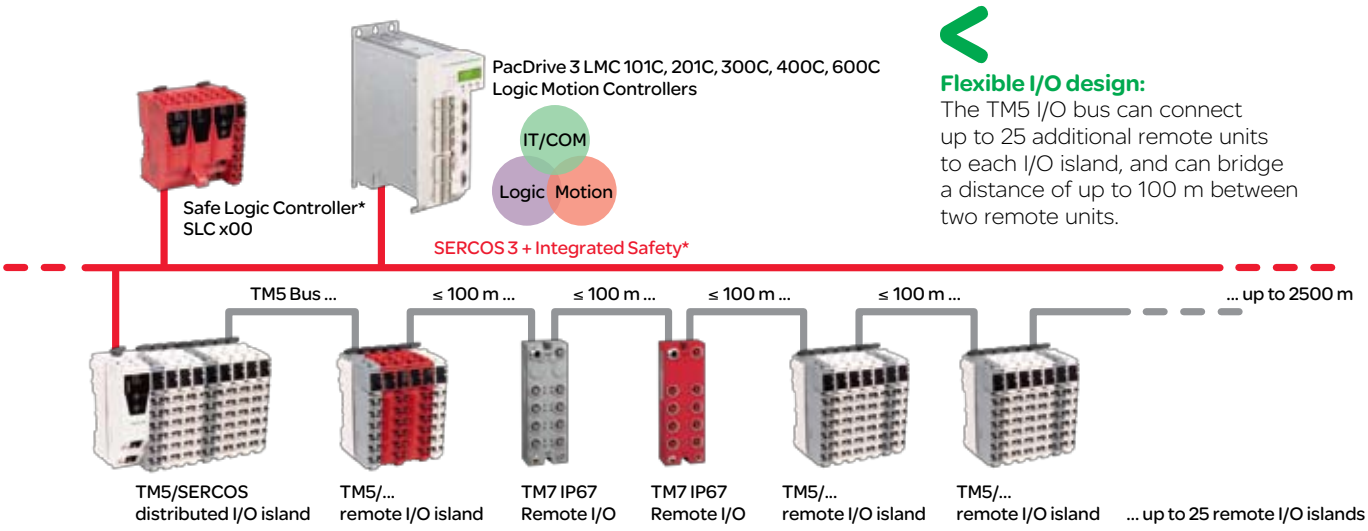
Other classic designs based on hardwired safety components can be implemented as well. Please consult with your Schneider Electric or Distributor representative to determine which Preventa Machine Safety products are best suited for your applications.

- Fully integrated safety solution
- Reduced installation costs, no more dedicated cabling
- Integrated Workbench tool for safety software in IEC 61131-3

* according to IEC 61508:1998, EN/ISO 13849-1: 2008

Rapid I/O communication via SERCOS 3

The new SERCOS 3 bus interface for the Schneider Electric universal TM5 I/O system lets you create I/O solutions for rapid communication. The TM5 product line offers a variety of products for designing your specific I/O solution on the SERCOS 3 automation bus.



Flexible I/O design:
The TM5 I/O bus can connect up to 25 additional remote units to each I/O island, and can bridge a distance of up to 100 m between two remote units.

Flexible and modular

The modular TM5 I/O system is specifically designed for creating distributed I/O solutions on the SERCOS 3 automation bus. I/O networks can be built with both line and ring topologies.

One terminal block can include up to 250 individual modules, with the basic unit of each I/O island being the SERCOS 3 interface, which is plugged into a bus base module together with the first terminal. Additional I/O modules can be snapped to this unit.

Each of these modules consists of three basic components: bus base, function unit, and one of the various terminal blocks, with the benefits of this design including rapid assembly and a reduced need for spare parts. Functional units that incorporate digital/analog I/Os, mixed-function units, and power supplies are also available.

The TM5 system provides additional flexibility with the option to connect additional remote terminal blocks to a terminal block via the TM5 I/O bus at distances of up to 100 m, using transmitter and receiver units. Up to 25 of these remote I/O units can be connected serially to a terminal block via the TM5 bus, and in extreme cases, the range can be extended up to 2.5 km for a distributed I/O solution!

* according to IEC 61508:1998, EN/ISO 13849-1: 2008

Plug together and snap in:
Components can be combined to create both the basis unit with the SERCOS 3 interface, as well as all additional functional modules, including safety modules*

Standardized and fast

Communication on the TM5 system corresponds to that of SERCOS 3 I/O-Profil V1.1.2. In addition to consolidation of drive and I/O communication on a shared, Ethernet-based medium, the primary advantage of I/O communication via SERCOS is its high transmission speed. With network update rates of up to 1 ms, the system can satisfy the most demanding response time requirements.

Expandable with IP67 technology or safety terminals*

The TM5 technology in IP 20 is essential for connecting the soon-to-be-released, highly compact TM7 modules to a SERCOS automation bus…and expanding the ability of I/O systems to operate under harsh environmental conditions. Safety communication* versions of both TM5 and TM7 modules are available, with special coloring to clearly differentiate them from standard technology. Standard and safety I/O modules can be mixed.

- Up to 30 % time savings for assembly, cabling, and commissioning
- Compact technology, small footprint
- Decentralized I/O islands via TM5 bus
- TM7 modules for IP67
- TM5 and TM7 modules both available for safety communication*

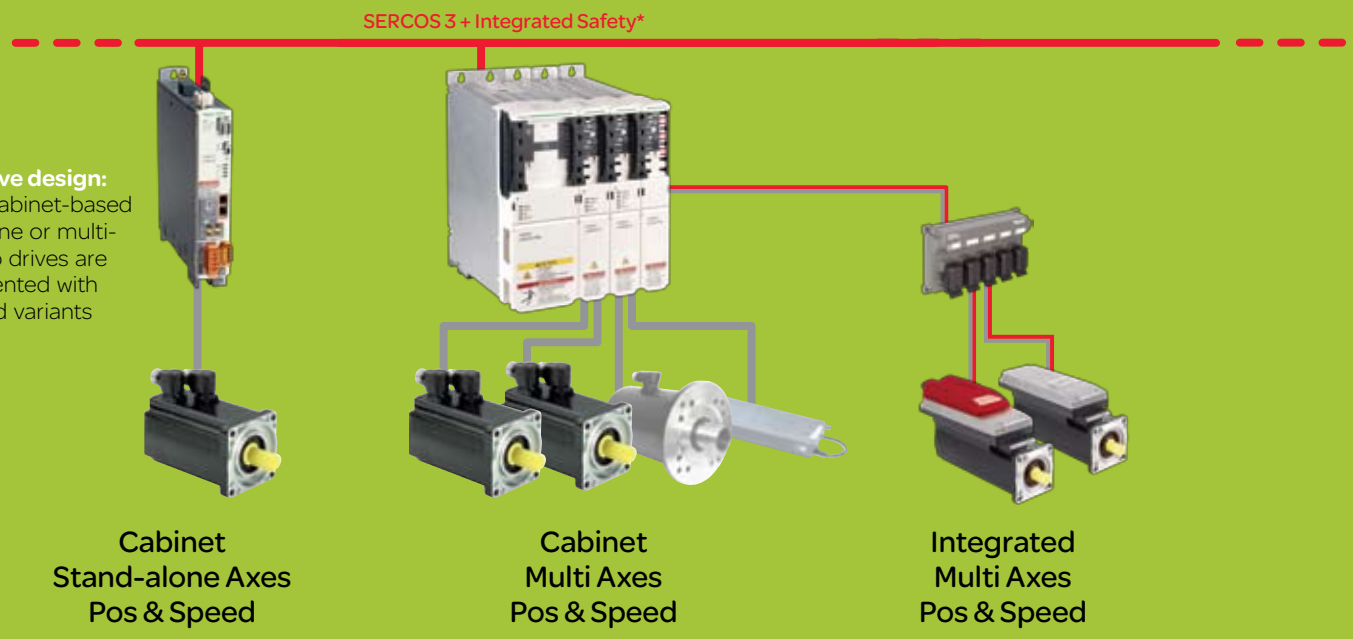
I/O islands in IP67:
The TM5 bus can be used to connect TM7 modules in both standard and safety* designs

* according to IEC 61508:1998, EN/ISO 13849-1: 2008

Schneider Electric Lexium™ Servo Drives: Flexible configuration and lower costs

The modular servo drives of the LXM 62 Series and the integrated ILM 62 drives reduce space requirements in the control cabinet and lower costs, particularly for multi-axis applications. Stand-alone drives with an integrated power supply will soon be available for servo drive solutions with self-contained single axes. These drives will also be supplemented with integrated stand-alone versions, as in the multi-axis design.

Flexible servo drive design: Control-cabinet-based stand-alone or multi-axis servo drives are supplemented with integrated variants



* according to IEC 61508:1998, EN/ISO 13849-1: 2008

Lexium™ LXM 62

Universal servo drives for multi-axis solutions

Schneider Electric's fully digital servo drives in the Lexium™ LXM 62 series are modular, consisting of single drives (1 axis) and double drives (2 axes) of equal size, as well as power supplies with different output. All single and double drives in a group use a shared power supply. Multiple groups are possible, with the number of axes being limited by the type of Controller used.

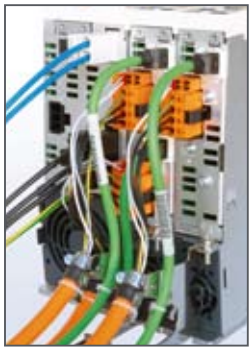
The Lexium LXM 62 series lets users implement cost-effective compact multi-axis solutions, with the double drives providing particular advantages.

All LXM 62 components offer easy handling and installation, startup, and replacement. The rapid, front side-connection to the power supply automatically includes integration into the DC bus as well. The motor and encoder cables exit at the bottom of the unit, leaving room for easy access at the front of the device.

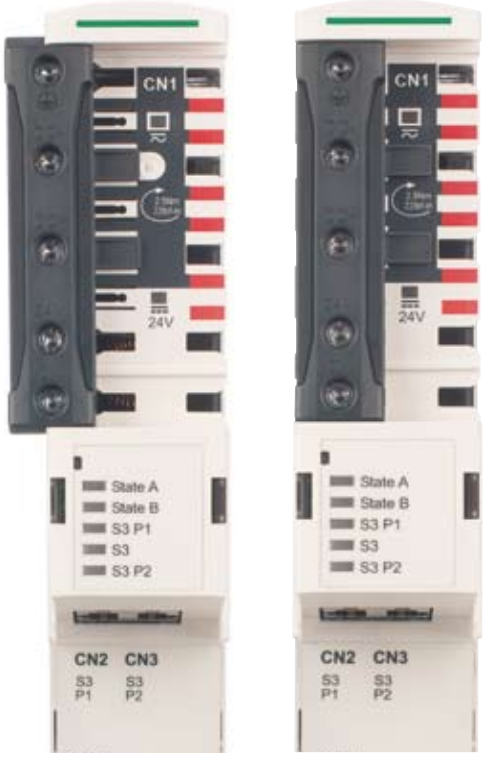
Integrated design:
Power supply and two drive modules – each half the width of the power supply

PacDrive 3: Servo Drives, Multi-axis Solutions

Motor/encoder cables exit at the bottom of the unit:
Leaves room at the front of the device for rapid assembly/disassembly of LXM-62 components



Connection to DC bus, 24 V power supply, and ground wire:
Move the slide to the left, tighten the screws, and it's done



Fast connection to SERCOS:
Single and double drives are integrated into the SERCOS ring with short cable bridges.

Technical Data / Servo Drives

Type: LXM 62		DU60A	DD15A	DD27A	DD45A	DxxxA	DU60B	DD15B	DD27B
Availability		Immediately				Pending	Immediately		
Number of synchronizable axes		1					2		
Continuous current A_{eff} (4kHz)		2	5	9	22	50	2 x 2	2 x 5	2 x 9
Peak current A_{eff}		6	15	27	45	100	2 x 6	2 x 15	2 x 27
Supply voltage [V]		Min. 250 V DC, max. 700 V DC							
Supply frequency [Hz]		48 to 62							
Control voltage [V]		DC 24 V (-20% / +25%)							
Inter-faces	Motion bus	SERCOS 3							
	Encoder	Hiperface (more available soon)							
	Inverter Enable	1 input					2 inputs		
	Digit. inputs	2					2 x 2		
	Digit. inputs or TP	2					2 x 2		
	Digit. inputs or outputs	2					2 x 2		
Housing dimensions D x W x H [mm]		270 x 44 x 310				270 x 89 x 310	270 x 44 x 310		
Protection rating		IP 20							
Excess voltage category		K3, T2 (DIN VDE 0110)							
Excess voltage resistance		–							
Degree of radio interference		–							
Certifications		CE, ULus							

Subject to change without notice

More innovation from Schneider Electric...

Another innovation is that all servo drives are coupled to the DC bus and to the power supply: No backplane connections are required, and the modules can be coupled to the adjacent module with a front-side quick-connect with stop screws in less than two minutes.

When the connection is made, LEDs signal proper power supply with the 24 V control voltage. The design functions without any additional effort, even when drives are taken out and reinstalled from a continuously connected series of devices.

LXM 62 Series servo drives can be used with all PacDrive System motors, both rotary and linear, and all servo drives have an electronic name plate. Upon first use or exchange of the device, it is identified by the centralized controller and configured based upon the specified parameters. The servo drives themselves in turn detect connected motors by their name plates.

LXM 62 servo drives can be integrated into safety automation designs (in accordance with IEC 61508:1998 SIL2, EN/ISO 13849-1:2008 PL d) by using the Inverter Enable input (or two in the case of double drives).

- Less space required in the control cabinet
- Minimal assembly/ installation time
- Tool-free motor connection
- Optimized feedback loops minimize contouring errors
- Safety input Inverter Enable (pursuant to IEC 61508:1998, EN/ISO 13849-1:2008) for each axis
- Automatic motor detection
- Software-compatible with integrated servo drives ILM and with stand-alone servo drives

Technical Data / Power Supplies

Type: LXM 62	PD84A	Pxxxx
Availability	Immediately	Pending
Continuous current (A)	42	120
Peak current (A)	84	179
Continuous output [kW]	25	67
Peak output [kW]	50	100
Supply voltage [V]	3AC208V (- 10%) to 3AC480V (+8%)	
Control voltage [V]	DC24V (-15% to +25%)	
DC bus voltage [V]	DC250V to DC700V	
SERCOS 3 interface	integrated	
Bleeder	Integrated	Recovery planned
EMC-Filter	Integrated	External
Housing dimensions D x W x H [mm]	270 x 89 x 310	270 x tbd x 310
Protection rating	IP 20	IP 20
Excess voltage category	K3, T2 (DIN VDE 0110)	–
Excess voltage resistance	–	–
Degree of radio interference	–	–
Certifications	CE, ULus	

Subject to change without notice

Lexium™ ILM 62

Multi-axis design for true plug-and-play modular machine building

- Multi-axis design requires up to 90 % less control cabinet space
- Different dimensions, with peak torques of up to 55 N•m
- Can be combined with single and double drives to a shared power supply
- 70% shorter cable lengths
- 90% less wiring required in the control cabinet
- 50% less cable installation required on the machine frame

Plug-and-play solution...

With quick interconnects and hybrid cables for signal and power level, automatic network configuration, and diagnostic functions… Schneider Electric's Lexium™ ILM 62 servo modules with integrated drive electronics are the technological successors to iSH servo modules. With more functionality than compact drives alone, this drive and network combination together form a true plug-and-play solution combining mechanics, electronics, and software.

Servo modules move servo drives out of the control cabinet and into the field. iSH technology reduces wiring and cabling requirements in the control cabinet by up to 90%, with the only components remaining in the control cabinet being the PacDrive controller, the shared power supply for 40 or more servo modules, and the CM (connection module).

The CM feeds power to the ILM 62 servo modules from the same power supplies as the LXM 62. The components, which have compatible dimensions, allow the assignment of ILM servo modules to groups with different safety functions*, for example.

* according to IEC 61508:1998, EN/ISO 13849-1: 2008

Smaller control cabinets:
With intelligent servo modules, the servo drives are mounted in the machine frame, leaving only the controller and the shared power supply in the control cabinet

Reduced costs… shorter installation time

ILM servo modules use a flexible cabling approach, consisting of pre-terminated hybrid cables and distribution boxes…and the network itself is configured as a plug-and-play solution. Compared to conventional servo solutions, this reduces the required cabling by up to 70%, and the labor required for installing the servo solution is reduced by approximately 50%.

Schneider Electric ILM servo modules are the key element in modular machine design. They permit modular design of mechanics, software, and even electronics. This makes ILM servo modules an ideal solution for machines with a variety of optional mechatronic modules. Aside from any additional power supply units required, any later addition of modules to a machine requires no changes in the control cabinet.

Peak torques of 3.5 to 55 N•m

ILM servo modules are planned in flange sizes of 70, 100, and 140 mm. A 55 mm flange will be available at a later date. This will completely cover a holding torque range of 1.1 to 12.5 N•m and/or a peak torque of 3.5 to 55 N•m.

The models are software-compatible with one another and with LXM 62 and LXM 52 Series servo drives… and, additional options include a holding brake, a feathered key groove, and a multi-turn encoder with electronic name plate. The addition of a shaft seal can increase the protection rating from IP40 to IP65.

Lexium™ LXM 52
Servo drives for compact applications

- Compact design
- High power density
- Software compatible with LXM 62 and ILM 62

In a conventional stand-alone design, Schneider Electric's Lexium™ LXM 52 Series servo drives are particularly well suited for economical configuration of servo drive solutions with self-contained single axes. They communicate via SERCOS 3 and are interchangeable with the LXM 62 and ILM 62 Series without any programming changes.

The servo drives have electronic name plates and can be automatically configured by the controller upon initial commissioning or following an exchange. They identify connected servomotors based upon their name plates and perform parameterization based upon the program specifications.

Lexium™ LXM 52 servo drives are ideal for applications with a small number of axes

Technical Data

Type	Lexium™ LXM 52				
Availability	Pending				
Number of synchronizable axes	1				
Continuous current (A_{eff})	1,5	3	6	10	24
Peak current A_{eff}	6	9	18	30	72
Continuous output [kVA]	0,3	0,9	1,8	3	7
Supply voltage [V]	380 V (-15%) to 480 V (+10%) AC				
Supply frequency [Hz]	48 to 62				
Control voltage [V]	DC 24 V (-20% / +25%)				
Motion bus	SERCOS 3				
Housing dimensions D x W x H [mm]	220 x 48 x 230			220 x 68 x 230	220 x 108 x 230
Protection rating	IP 20				
Excess voltage category	KIII, T2 (DIN VDE 0110)				
Excess voltage resistance	–				
Degree of radio interference	–				
Certifications	CE, cULus (Pending)				

Subject to change without notice

Lexium integrated stand-alone servo drive: The integrated drive for compact applications

Stand-alone drives installed in control cabinets are not the only option for applications with a small number of axes. Integrated drives are also available, just as with multi-axis designs. With these innovative integrated servo drives, the required components for controlling and powering a servo motor are combined into a single assembly.

Rotary and linear servo motors

Modern, high-speed production machines require highly dynamic, precise AC servo motors with a wide range of rated torques. Brushless, overload-protected servo motors – with high resolution encoders as well as torque and linear motors – provide solutions for a variety of applications. All of the Schneider Electric servo motors shown below can be operated by Lexium™ LXM 52 and LXM 62 servo drives, and integrated into synchronized multi-axis systems on the SERCOS 3 interface.

Low inertia rotor: Lexium SH Series AC motors meet the highest performance requirements

SH
Servo motors in five flange sizes

Schneider Electric SH motors are available in five flange sizes – from 55 mm to 205 mm, and a wide range of rated torques – and are ideal for many applications. SH motors deliver impressive dynamics because of their low inertia compared to other servomotors. They are exceptionally compact thanks to salient pole winding technology, and the sleek housing is equipped with plug connectors that can be rotated 270°. The electronic name plate makes these motors an integral component of the PacDrive 3 automation system.

There are different options available for including SH servo motors with customized drive solutions, as all of the motors are equipped with high-resolution, single-turn or multi-turn absolute value encoders. Additional shaft seals can be integrated for increased protection of bearings, and these motors can be adapted to harsh environmental conditions with an optional IP67 kit.

Technical Data

Flange Size/ Length	Holding torque Ambient cooling M_0 [N•m]	Holding torque current Ambient cooling I_0 [A]	Holding torque Fan cooled* M_0 [N•m]	Holding torque current Fan cooled* I_0 [A]	Peak torque M_{max} [N•m]	Rotor inertial load J_M [kgcm²]	Rated speed n_N [min-1]
SH055/1	0,5	0,73	–	–	1,5	0,059	8000
SH055/2	0,8	1,2	–	–	2,5	0,096	8000
SH055/3	1,2	1,7	–	–	3,5	0,134	8000
SH070/1	1,4	1,8	–	–	3,5	0,25	6000
SH070/2	2,2	2,9	–	–	7,6	0,41	6000
SH070/3	3,1	4,1	–	–	11,3	0,58	6000
SH100/1	3,3	3,5	4,3	4,7	9,6	1,0	5000
SH100/2	5,8	4,8	7,5	6,3	18,3	2,31	4000
SH100/3	8,0	6,6	11,0	9,0	28,3	3,22	4000
SH100/4	10,0	6,2	14,2	8,9	40,5	4,22	3000
SH140/1	11,1	7,8	15,6	11,0	27,0	7,41	3000
SH140/2	19,5	13,2	30,8	21,6	60,1	12,68	3000
SH140/3	27,8	17,6	42,4	27,7	90,2	17,94	3000
SH140/4	33,4	21,3	54,8	33,6	131,9	23,0	3000
SH205/1	36,9	2,01	46,9	28,9	110,0	71,4	3000
SH205/2	64,9	25,7	87,2	37,3	220,0	129,0	2000
SH205/3	94,4	33,2	124,5	47,2	330,0	190,0	2000

Subject to change without notice

- Compact design and high power density thanks to salient pole windings
- Low inertia rotor
- Electronic name plate
- Optional shaft seals, integrated brakes
- Triple overload capacity
- Exterior fan cooling or water cooling for better capacity utilization
- Optional IP 67 rating for harsh environmental conditions
- Single-turn or multi-turn absolute value encoder

Direct drives

High precision with minimal wear

In contrast to conventional drive solutions, rotary and linear direct drives generate torque precisely where it is needed in the machine. The absence of detours through gears or belts allows the generation of significant torque. It also reduces the space requirements for drive components, and eliminates parts that may be subject to mechanical wear and tear. Benefits include less maintenance and greater reliability. Because of its superior dynamics when compared with other drive solutions, direct drive technology offers improved machine performance in many cases.

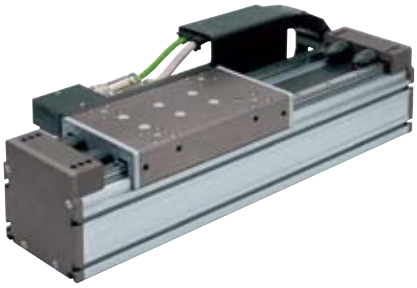
Schneider Electric's PacDrive 3 technology can be used to integrate rotary and linear direct drives into synchronized multi-axis systems. Both motor types can be operated with standard Lexium™ LXM 52 and Lexium LXM 62 Series servo drives, even with high-speed machines having demanding synchronization requirements.

In contrast to standard servos, both direct drive models generally require more precise tuning and/or adaptation to a specific application. Schneider Electric recommends that you consult with our expert teams of application engineers and motor specialists to select suitable motor types for your machines.

If necessary, we can even provide assistance on integrating the motors into your application. This helps reduce risks when getting started with direct drive technology.

+

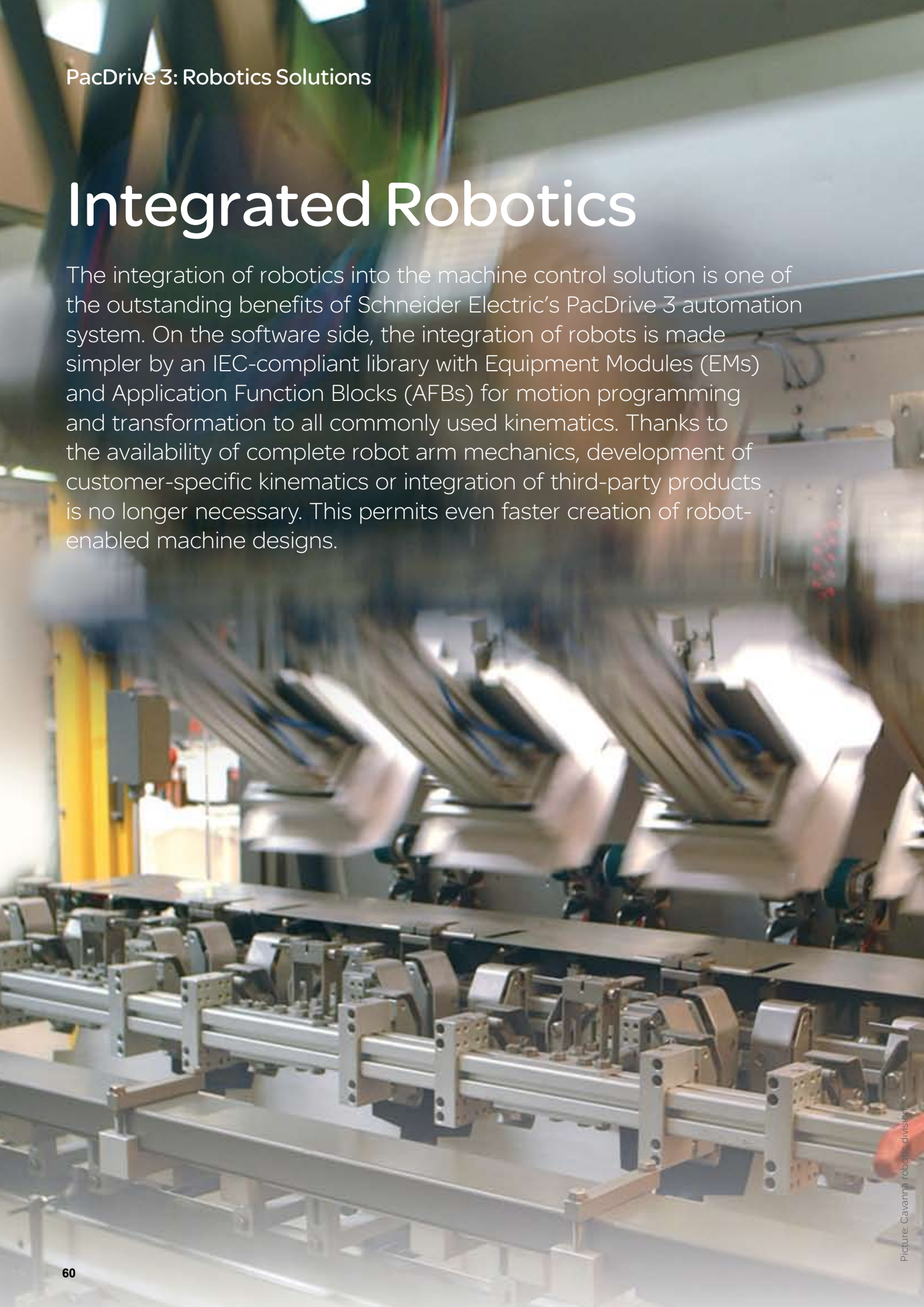
- Highly dynamic drives
- Linear drives reduce wear and tear
- Direct drives generally deliver high precision
- Engineering support available upon request for drive selection and application



Direct drive technology for PacDrive:
Lexium servo drives can operate a wide range of linear and torque motors

Integrated Robotics

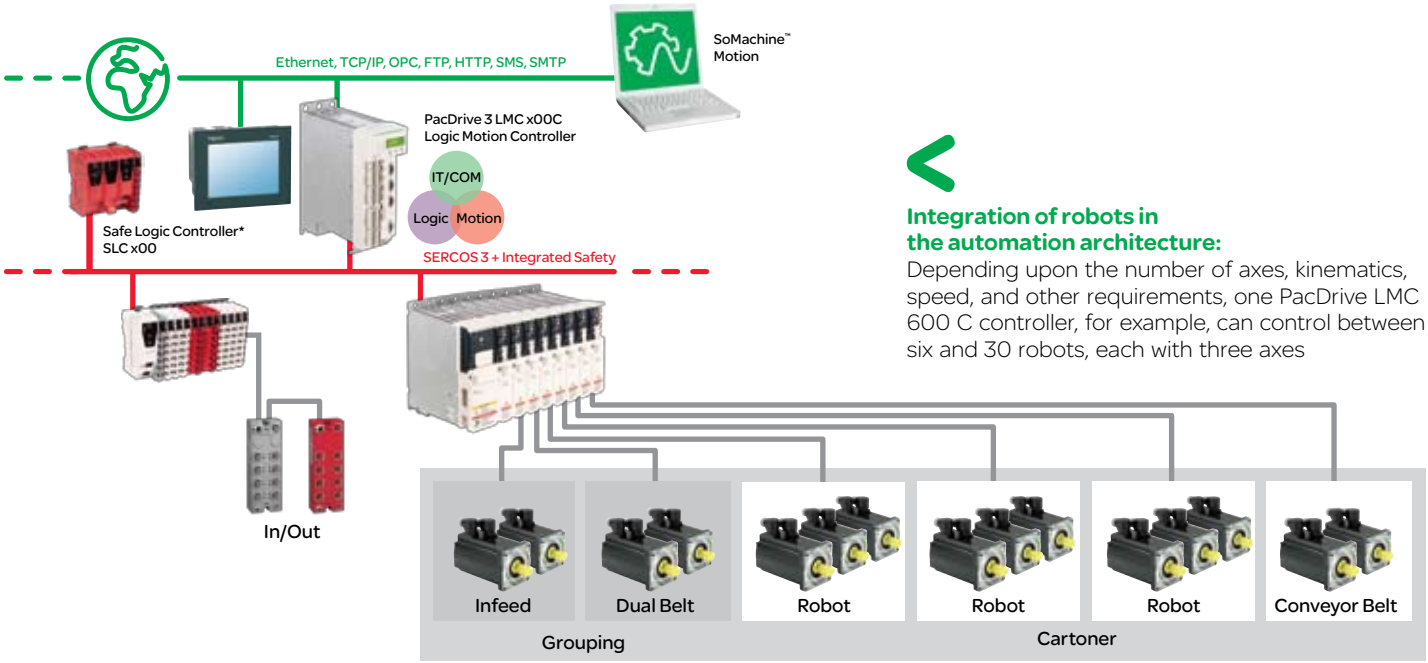
The integration of robotics into the machine control solution is one of the outstanding benefits of Schneider Electric's PacDrive 3 automation system. On the software side, the integration of robots is made simpler by an IEC-compliant library with Equipment Modules (EMs) and Application Function Blocks (AFBs) for motion programming and transformation to all commonly used kinematics. Thanks to the availability of complete robot arm mechanics, development of customer-specific kinematics or integration of third-party products is no longer necessary. This permits even faster creation of robot-enabled machine designs.



Picture: Cavanna robotic division

Integral automation architecture

The Schneider Electric PacDrive 3 system supports an almost unlimited variety of kinematic configurations, allowing robotics to become an integral part of a machine's automation architecture. High-performance PacDrive 3 Controllers are capable of synchronizing up to 99 axes in a real-time multi-axis system. From the controller perspective, a robot is reduced to a motion control system with a corresponding number of servo axes, which can operate under demanding real-time conditions. In this way, the controller can manage one or more robots in addition to other machine functions within an IEC 61131-3-compliant program.



Integration of robots in the automation architecture:
Depending upon the number of axes, kinematics, speed, and other requirements, one PacDrive LMC 600 C controller, for example, can control between six and 30 robots, each with three axes

- One controller can control machines and multiple robots
- Software integration using Function Block library
- Integrated IEC 61131-3-compliant software, no additional programming tools
- Easy access to process parameters
- One HMI concept for machines and robots
- Transformation modules for popular robotic kinematics such as Gantry, Scara, Portal, Articulated, Delta

Easy software integration thanks to AFB and EM libraries

The integration of robots into the PacDrive 3 automation solution software drastically reduces the number of complex software algorithms needed for the solution. Robots are mapped onto a software module, which is then inserted into modular, IEC-61131-3-compliant program structures, just like other mechatronic machine modules. This structure is based upon library Function Blocks that are parameterized by the user or "fed" with motion data in the form of a program or a table. Once motion paths have been defined, parameters can be specified in order to limit the acceleration forces that act on the transported product. The option to specify blending parameters provides further potential for optimizing the motion paths. The controller performs all of the other functions, including actuation of the robot axes, based upon library Function Blocks.

Transformation modules for PacDrive 3 and standard kinematics

In the PacDrive robotics solution, motion programming and its transformation to robot kinematics are separate processes. This means that the robot kinematics can be selected independently of the generated motion program. Regardless of whether the project uses standard kinematics developed by the customer, third-party suppliers, or PacDrive mechanics – Delta-2, Delta-3, gantry, and portal kinematics are currently available – the appropriate transformation module adapts the selected solution to the motion program.

In principle, the available transformation modules can be used to adapt all typical 2 to 6-axis systems.

* according to IEC 61508:1998, EN/ISO 13849-1: 2008

Motion transformation: Appropriate transformation modules incorporate all typical kinematics into the controller software, whether it involves PacDrive robotics or customized kinematics

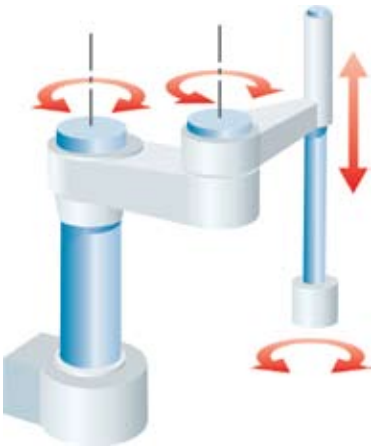
Delta 2

Delta 3

Gantry

Portal

In addition to transformation modules mapped to these kinematics, a universal transformation module is also available for custom-designed or third-party kinematics, allowing various robots to be controlled with PacDrive 3 Controllers



Scara

Articulated

Fraunhofer IPA
TESTED® DEVICE
ELAU GmbH
P4s(z)-x-CW-15-1200
Report No. EL 1004-519

PacDrive P4

Complete robotics packages for Delta 3 kinematics

Everything fits together: Robot mechanics, servo systems, and the robotics library provide a ready-to-use solution. In addition, complete packages, including engineering, can accelerate the integration of robotics into an application.

P4 delta-3 robot kinematics:
With standard motors, available in washdown configuration up to IP 65

The **P4 delta-3 robot** from Schneider Electric, featuring full stainless steel construction, is designed for pick-and-place applications, as the software includes a pre-programmed interface for integration of the most commonly encountered vision solution. The P4 can be equipped with an optional rotational axis (P4s-R), with the P4 robot arm being driven by conventional motors with cabinet-mounted servo drives (P4s-F or P4s-R) or by intelligent servo modules with integrated control electronics (P4i-F or P4i-R). Thanks to their IP 65 rated washdown configuration, the P4s-F and the P4s-R are also suitable for hygienic environments. The P4 is also available in an ISO 14644-1-certified Class 6 cleanroom design.

Type	P4s-F / P4s-R	P4i-F / P4i-R
Load capacity	1,5 [kg]*	
Max. speed	10 [m/sec]	
Max. acceleration at 1kg	100 [m/sec2]	
Max. acceleration at 1.5kg	75 [m/sec2]	
Number of axes	3 (4**)	
Repeatable position accuracy	+/- 0,1 [mm]	
Work envelope height	225 / 350 [mm]	
Work envelope diameter	1200 / 750 [mm]	
Work envelope rotation*	Unlimited	
Protection rating	IP 65	–

* up to a maximum of 3.5 kg with reduced acceleration
** including rotational axis in the R version
Subject to change without notice

Linear Motion

Single and multi-axis systems for linear motion

Portal axes:
Left: PAS S (spindle drive), center: PAS B (timing belt drive), and right: TAS linear table

Cantilever axes:
Left: CAS (round rod axis), right: CAS 4x (profile axis)

MAX H two-axis system:
Designed for positioning over long distances

MAX P linear positioner:
The combination of double axis system and cantilever axes can be mounted both above and below the workspace

The Schneider Electric modular linear motion system consists of basic elements and complete solutions for a variety of 1, 2, and 3 dimensional motion tasks. Thanks to its modular structure, the elements can be configured as needed, with the length and stroke of each axis system being individually determined.

Portal axes in various sizes – with timing belt drive or spindle drive as desired – can move loads of up to 100 kg. The structural elements of these linear tables are extremely rigid, and the overall assembly has very compact dimensions, with **Cantilever axes** with round rods or a profile design being particularly well suited for limited spaces. Thanks to the fixed motor and moving body of the axis, cantilever axes can move flexibly into the work envelope.

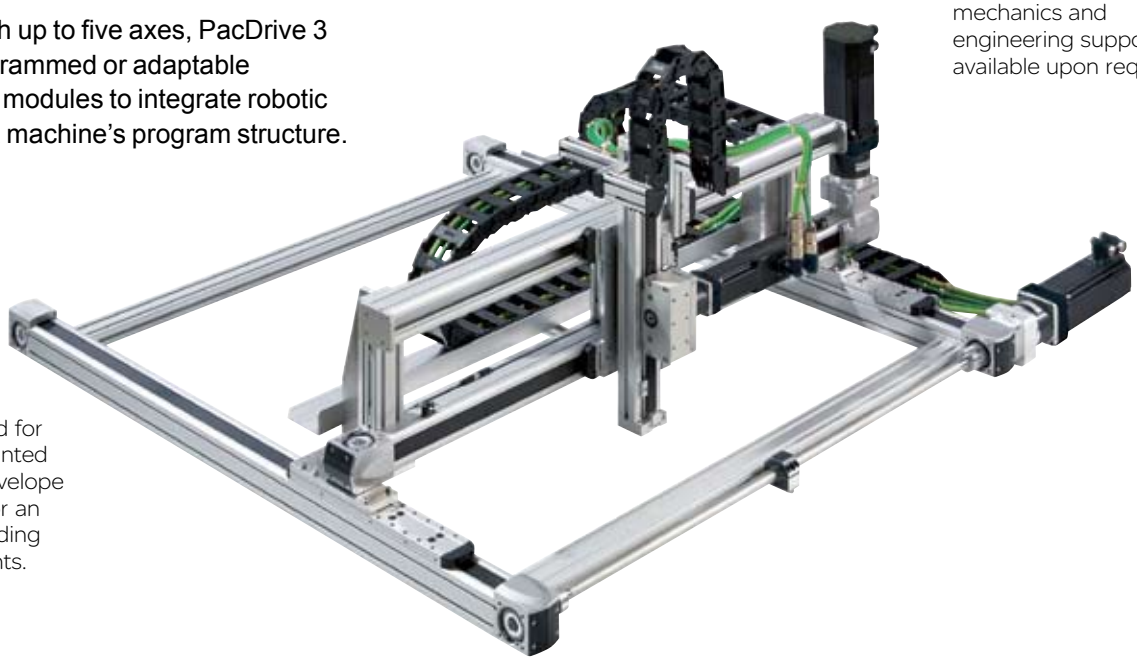
MAX H Double-axis systems move loads with great flexibility and speed across distances of up to 5 1/2 meters. They also serve as a basis for complete solutions involving multi-dimensional motion tasks.

The **MAX P linear positioner**, a combination of double-axis system and cantilever axis, moves up to 50 kg with a high level of precision.

- Mechanics packages available for linear axes up to three-axis portal
- Compatible components
- Support and service from a single source for the entire automation solution
- Complete package of mechanics and engineering support available upon request

The **MAX R portal robot** with two servo axes, and the **MAX R 3** with three servo axes, are the top-of-the-line designs for the modular linear motion system. A rotational axis can also be integrated as an option.

For models with up to five axes, PacDrive 3 offers pre-programmed or adaptable transformation modules to integrate robotic solutions into a machine's program structure.



Portal robot MAX R2 or R3:
This robot is used for applications mounted over the work envelope as either an x-y or an x-y-z unit, depending upon requirements.

Technical Data

	Single-axis systems					
	PAS B	**PAS S**	**TAS**	**CAS**		
	Portal axis	Portal axis	Linear table	Cantilever		Telescoping axis
Design				Profile	Round rod	Profile
max. load [kg]	100	100	150	50	18	35
max. stroke [mm]	5500	3000	1500	1200	500	2400
Positioning speed [m/s]	8	1,25	1	5	2	5
Guides	Roller bearings/ ball bearings	Ball bearings	Recirculating ball bearings	Roller bearings/ Recirculating ball bearings	Recirculating ball bearings	Roller bearings/ Recirculating ball bearings
Version	–	–	–	Profile	Round rod	Profile
Drive element	Timing belt	Spindle	Spindle	Timing belt	Timing belt	
	Double-axis and Multi-axis systems					
	MAX H	**MAX S**	**MAX P**	**MAX D**	**MAX R2**	**MAX R3**
	Double-axis system		Linear positioner		Portal robot	
Axes	1	1	2	2/2	2	3
max. load [kg]	250	300	50	2/5	137	50
max. stroke in x [mm]	5500	5500	5500	300/700	5500	5500
max. stroke in y [mm]	–	–	–	–	1500	1500
max. stroke in z [mm]	–	–	1200	150/300	–	1200

Subject to change without notice

Operator interfaces with display panels from 3.8" to 19"

The variety of product sizes provided by Schneider Electric's Magelis™ HMI program – with its Small and Advanced Panels – opens up a wide range of HMI design possibilities. An ARTI driver simplifies the engineering phase for integrating PacDrive 3 solutions, by providing direct access to the runtime system variables.

The right size for the right display: Magelis HMI panels allow users to create customized solutions with less engineering time

Hardware variety

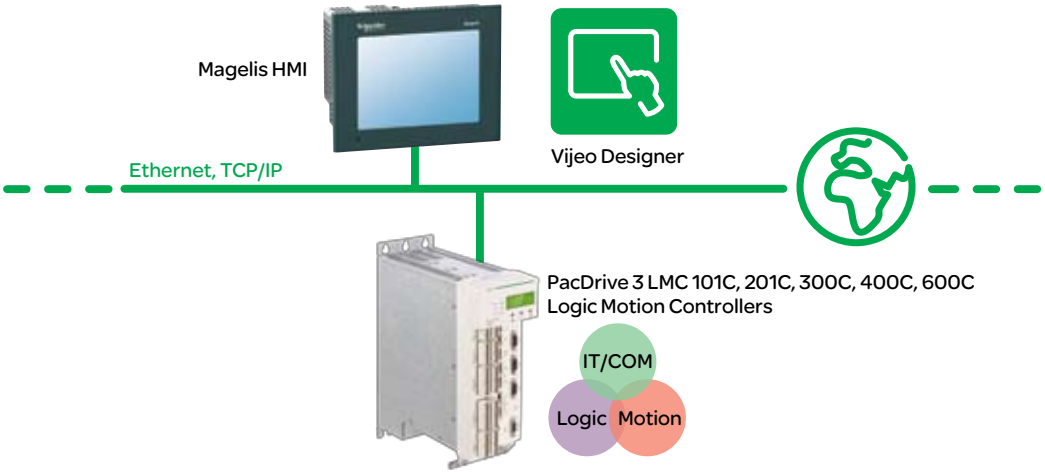
Depending upon the model, Schneider Electric's Magelis™ HMI systems are available in display sizes ranging from 3.8" to 19", with different hardware features opening up possibilities for individual applications. Touchscreen panels with VxWorks, Windows® XP, or XP embedded are available for standard operating systems, and solutions with separate display monitors and their associated hardware, or handheld devices offer still more alternatives. Flexible configurations with application memory and/or memory cards for flexible memory expansion – as well as a variety of interfaces – make it easy to integrate display panels into your applications.

Easy connection:
Magelis HMI display panels include most popular interfaces

Efficient Engineering

Schneider Electric's Vijeo Designer™ configuration software can be used to uniformly implement PacDrive 3 Magelis-based HMI solutions. An ARTI protocol driver reduces engineering time by building a bridge directly from the configuration tools to the controller application, providing direct access to runtime system variables, which can then be easily browsed using the configuration tool. The "otherwise typical, additional definition" of variables for the HMI application is no longer required.

- Touchpanels, keyboard entry devices
- Detachable solutions and handheld devices
- Different operating systems
- Optimal integration into PacDrive 3 solutions with ARTI drivers



Direct access:
An ARTI protocol driver is the basis for high-speed communications between the HMI panel and the controller, with access to the runtime system variables

Automation components on the field bus

As an alternative to integrated Ethernet-based communication, Schneider Electric's PacDrive 3 system also offers dual-track designs for conventional field buses. In this case, SERCOS 3 is the bus for communication with the servo drives, and field devices can be integrated into the automation solution via CAN, PROFIBUS™ DP, or other field bus standards. Positioning solutions, variable frequency drives – and motor protection components communicating via field bus – supplement the automation solution to meet specific application needs. With PROFIBUS, CANopen™ and DeviceNet™ connections, the range of products covers all standard IP 20 and IP 67 rated I/O configurations.

Lexium™ ILx
Integrated Positioning Drives

Schneider Electric's Lexium™ line of integrated drives combines the motor, positioning control, power electronics, field bus, and the "Safe Torque Off" safety* function in a single assembly. Three product options are available:

The **Lexium ILA**, with a servo motor, delivers a high degree of dynamics. It generates high torque even during acceleration. Different winding types are available for application-specific requirements.

The **Lexium ILE**, with an electronically commutated motor, offers a high degree of flexibility. The 3-phase synchronous electronically commutated brushless DC motor has a high holding torque of up to 8 N•m (with spur gear drive), often eliminating the need for a holding brake. The integrated electronics communicate absolute position to the automation controller.

The **Lexium ILS**, with a step motor, is the most precise of the three. The 3-phase step motor generates high torque at low speeds – often eliminating the need for a gear reduction – permitting space saving direct drive solutions. The Lexium ILS is the solution for high resolution positioning with good synchronization. Commissioning involves little effort – the user merely needs to adjust the power supply.

All integrated Lexium drives can communicate via CAN, EtherNet/IP, or PROFIBUS™ DP.

- 40% less wiring required
- 25% less cabling required
- Flexibility thanks to three possible motor technologies
- Can be used with popular field buses
- Simple installation and commissioning
- Integrated safety* thanks to safety* function
- Safe Torque off (STO) pursuant to IEC/EN 61800-5-2

Lexium integrated drives: Three product options with three different motors

Technical Data

Motor	Speed range [rpm] (direct drive) [1/min]	Continuous torque (direct drive) [N•m]	Peak torque (direct drive) [N•m]	Encoder	Holding brake	Optional gearing
ILA servo motor drive	< 7500	< 0,26	< 1,62	High-resolution encoder (16384 increments)	Yes	Planetary gear unit (Gear ratios from 3:1 to 40:1)
ILE EC motor drive	< 5000	< 0,24	< 0,80	Hall sensors	No	Cylindrical and planetary gear unit (Gear ratios from 18:1 to 115:1)
ILS step motor drive	< 2000	< 6	< 6	With or without index pulse encoder (optional)	Yes	Planetary gear unit (Gear ratios from 3:1 to 8:1)

Subject to change without notice

* according to IEC 61508:1998, EN/ISO 13849-1: 2008

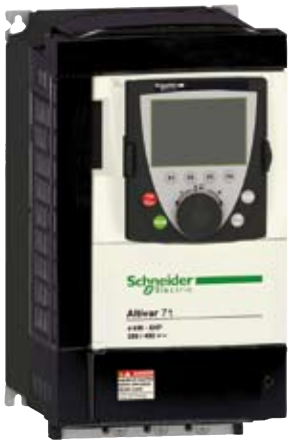
Altivar™ 312/32/71
Variable frequency drives

Schneider Electric's Altivar™ family of variable frequency drives offers the right drive speed controller for different applications. Like the Altivar 32, the Altivar 312 is appropriate for simple machines with a power range of up to 15 kW. For more complex machines with higher performance, the Altivar 71 with its power range of 0.37 to 1300 kW is the right solution.

Altivar:
Variable frequency drives for both simple and complex machines; pictured are the ATV 312, 32, and 71 models

Altivar 312

Altivar 32



Altivar 71

The Altivar 312, 32, and 71 series are well suited for areas such as packaging, transportation, conveyors, positioning systems, or textile machines. This makes them ideal for PacDrive 3 automation solutions. Time-saving Function Blocks – for integrating these frequency drives – are provided in the PacDrive software library.

All models can communicate via Modbus™ or CANopen™, and all can be connected to PROFIBUS™, Ethernet IP, and DeviceNet™ through integrated communication cards. Versions with connection via SERCOS 3 are pending.

- Wide performance range
- Integrates easily into PacDrive 3 solutions
- CANopen integrated, additional field bus options available for ATV 71 and 32

Technical Data

Altivar type		ATV 312	ATV 32	ATV 71
Power range in kW (50 to 60 Hz power supply)	Single-phase 200 to 240 V	0,18 to 2,2	0,18 to 2,2	0,37 to 5,5
	3-phase 200 to 240 V	0,18 to 15	0,18 to 15	0,37 to 75
	3-phase 380 to 480 V	–	–	0,75 to 1300
	3-phase 380 to 500 V	0,37 to 15	0,37 to 15	–
	3-phase 525 to 600 V	0,75 to 15	–	–
	3-phase 500 to 690 V	–	–	2,2 to 2000
Output frequency in Hz	–	0,5 to 500	0,1 to 599	1 to 1600 Hz to 37 kW, 1 to 500 Hz from 45 to 500 kW
Short-term overload moment in % of the rated motor moment	for 2 s	200	200	220
	for 60 s	170	170	170

Subject to change without notice

Lexium™ SD3 28

Step motors on the field bus

The Schneider Electric Lexium™ SD3 28 step motor drive is a powerful positioning solution for communication via PROFIBUS™, CAN, and CANopen™. The different product options are designed for holding torques of 1.7 to 19.7 N•m, with the safety function "Safe Torque Off" (STO pursuant to IEC 61800-5-2) already integrated with the device. These drives are available for up to 6.8 A, with the SD3 28 being suitable for a power supply with 1~115 VAC and 230 VAC (50/60 Hz). A power filter is integrated, and the current is reduced automatically at zero speed. The SD3 28 can also be equipped with motion monitoring on request.

Lexium SD3 28 step motor drives:
Compact plug-and-play solutions with minimal space requirements in the control cabinet

Technical Data

3-phase step motor Type	Step motor drive 115 V/230 V Type	Holding torque at zero speed [N•m]	Maximum torque [N•m]	Maximum speed (RPM) [1/min]
BRS368Wx	SD3 28 x U25 (2,5 A)	1,7	1,5	2000
BRS397Wx		2,3	2,0	2000
BRS39AWx		4,5	4,0	2000
BRS39BWx		6,8	6,0	2000
BRS3ACWx	SD3 28 x U68 (6,8 A)	13,5	12,0	2000
BRS3ADWx		19,7	16,5	2000

Subject to change without notice

- Plug-and-play without encoder systems and commissioning software.
- Excellent synchronization
- High torque even at low rotational speeds
- Integrated safety functionality (STO)*

* according to IEC 61508:1998, EN/ISO 13849-1: 2008

Recording, notification, power distribution and switching

Schneider Electric manufactures an extensive product line of electrical equipment for machine construction, production lines, and entire production facilities, including: Power supplies, mounting and cabling systems for low voltage and medium voltage applications, and control and signaling equipment. The following excerpt from our product portfolio demonstrates the wide variety of solutions we offer. Together, they can provide you with the tools necessary for your particular needs and your specific solutions.

TeSys™ U Motor starter:
Space-saving combination of short-circuit protection disconnect switch, overload relay, and contactor, with modular design for greater flexibility

Safety signal recording* with Preventa™:
Light curtains, switches, switch mats, and many other components trigger safety responses in a wide variety of situations

Safety dialog* with Preventa:
With pullcord emergency switches, emergency stop buttons, enabling switches, foot switches, and two-hand control units, this program includes all of the popular solutions for safety-related command and signaling devices

* according to IEC 61508:1998, EN/ISO 13849-1: 2008

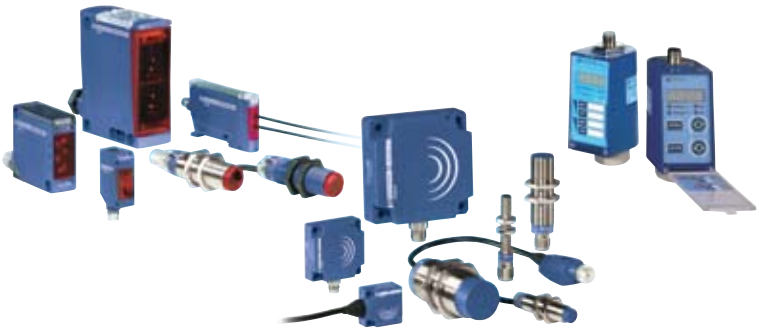
Harmony™ control and signaling devices:
Signaling technology as well as a series of lighted and unlighted pushbuttons, switches, and much more

Altistart™ 01 and 48:
Soft starters for AC induction motors and three-phase AC induction motors for 0.18 to 630 kW. Ideal for use in combination with Altivar™ ATV 312 and ATV 71 frequency converters

GV3 motor starter and protector:
Triggers at motor currents of 9 to 65 A, with thermomagnetic or magnetic triggers if needed

OsiSense™ XG:
Open and extremely compact RFID system for all popular ISO data media based on the 13.56 MHz standard

Control cabinets and enclosures:
Wide range of sizes, materials, and installation accessories



OsiSense - Recording systems and sensors:
A complete range of sensors – optoelectronic, inductive, or ultrasound recording as well as positioning switches – for most industrial automation applications

Compare for yourself

The complexity of power automation systems and the number of individual factors involved often make it difficult to directly compare one system with another. Use our checklist on page 75 to identify the benefits of the Schneider Electric PacDrive 3 system...then compare these with what our competitors offer.

User benefit	PacDrive 3
International assistance available	International assistance is standard at Schneider Electric, one of the world's largest suppliers of automation technology and electrical equipment.
Complete solutions from a single source	Complete automation solutions, electrical equipment, installation, mechatronics, SCADA and MES systems
Support	24/7 Help Line
Open standards	Programming design is IEC 61131-3 compliant. IEC standards for field bus communication, international IT standards for vertical integration or remote maintenance
Sustainability	PC Intel platform, long-term availability of controllers, drives, and motors
Universal controller functionality of the hardware platform	PLC, motion, and IT functionality, no additional and/or proprietary controller hardware required for the complete machine (incl. robotics)
Scalability	Up to 99 servo drives, software can be ported between platforms
Ethernet-based automation bus	SERCOS 3, manufacturer-neutral and IEC standard
Diagnostic functionalities	Up to motor shaft thanks to electronic name plates in motors and drives, and message loggers. Software oscilloscope for simultaneous display of PLC and motion variables
Simulation	Programs can be tested without real axes by using centralized controller architecture
Flexible design of servo drive architectures	Stand-alone servo drives, multi-axis system with single/double drives and shared power supply. Servo drives with integrated controllers to be released soon
Broad range of servo motors	High-performance standard motors, torque motors, and linear drives for a wide range of torque
Safety design*	Standard solution available, integrated solution with safety PLC*. Safety communication and safety I/Os* via SERCOS 3 to be released soon
Rapid installation and commissioning	Plug-and-play technology thanks to electronic name plates in servo system components. Hot-plugging of components on motion bus, extensive use of plug connectors
Remote maintenance	Remote maintenance via IP connection and diagnostic tools
Integrated tool design	Complete workbench with tools for the entire engineering process…for functional safety*, commissioning and diagnosis, central database, and multiuser design for simultaneous work on projects
Tool for motion design	Graphic motion design, drivetrain design, and power supply analysis in a single tool. VDI motion rules available
Machine diagnostics	Software tool diagnostics integrated into SoMachine Motion Workbench. Can also be used separately from Workbench (available free of charge).
Support of modular machine designs	Programming tools completely designed for modular program structures. Standardized software structures with optional use of the PacDrive programming template (Machine Pilot)
Function Blocks for creating the machine program	PacDrive Libraries with AFBs for basic motion, PLC, cam disk, and technology functions, mathematical functions, torque handling, dual-belt and multi-belt mechanisms, infeed, HMI applications, simulation and testing (ETest), etc.
Function Blocks for program standardization	PacDrive Libraries with AFBs for ANSI/ISA S88 Technical Report (OMAC/PackML), Weihenstephan standard, and FDA…as well as operating mode, error and error response management, process control, and pre-defined commissioning screens.
Function Blocks at the machine/machine module level	Operating modes, error and error reaction management, process control, predefined commissioning resources in the HMI
Hardware and software integration of robotics in machines	Robots are controlled by the machine's centralized PacDrive 3 Controller, requiring no additional controller hardware. Software integration with IEC 61131-3-compliant library Function Blocks for path generation, path optimization, transformation to all popular kinematics…as well as synchronization with conveyor belts, products, and other robots.
Robots	Complete robotics kinematics packages are available, including drives, electronics, and software

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