



PacDrive 3 General Presentation

A complete automation solution for
motion-centric machines

Quick access to product information

Get technical information about your product

References

Modicon TM3
I/O expansion modules for Modicon controllers
Analog I/O modules

Number and type of channels	Input range	Output range	Resolution	Input format (internal)	Reference	Weight (kg)
2 voltage/current inputs	-15...+15 VDC 0...20 mA r.t. 20 mA	16.00V or 12.00V r.t.	16.00V or 12.00V r.t.	Source	TM3AI2H	0.110
4 voltage/current inputs	-15...+15 VDC 0...20 mA r.t. 20 mA	16.00V or 12.00V r.t.	16.00V or 12.00V r.t.	Source	TM3AI2G	0.100
4 voltage/current inputs	-15...+15 VDC 0...20 mA r.t. 20 mA	16.00V or 12.00V r.t.	16.00V or 12.00V r.t.	Source	TM3AI2D	0.100
4 differential temperature inputs (I ² C, R, S, T, N, E, C)	Thermopiles or thermistance (PT100, RTD, PT1000)	16.00V or 12.00V r.t.	16.00V or 12.00V r.t.	Source	TM3TI2D	0.110
4 differential temperature inputs (I ² C, R, S, T, N, E, C)	Thermopiles or thermistance (PT100, RTD, PT1000)	16.00V or 12.00V r.t.	16.00V or 12.00V r.t.	Source	TM3TI2G	0.100
8 self-diagnosing	-15...+15 VDC	16.00V or 12.00V r.t.	16.00V or 12.00V r.t.	Source	TM3AI2L	0.110

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TM3AI2H

Module TM3 - 2 analog inputs high resolution

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Related Software >

Product Datasheet User guide Catalogue CAD Document

Characteristics Documents and Downloads Technical FAQs Additional Information Dimensions Drawings >

Main

range of product Modicon TMI

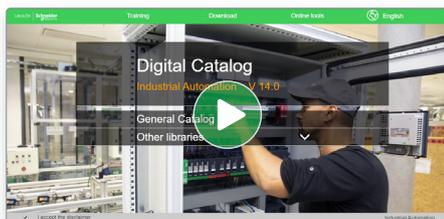
product or component type Analog input module

range compatibility Modicon M251

Each commercial reference presented in a catalog contains a hyperlink. Click on it to obtain the technical information of the product:

- Characteristics, Dimensions and drawings, Mounting and clearance, Connections and schemas, Performance curves
- Product image, Instruction sheet, User guide, Product certifications, End of life manual

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General content

PacDrive 3

A complete automation solution for motion-centric machines

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To be competitive in today's digital era, machine builders must be innovative. Smart machines, those that are better connected, more flexible, more efficient, and safe, are enabling machine builders to innovate in ways never before possible.

EcoStruxure, Schneider Electric's open, IoT-enabled architecture and platform, offers powerful solutions for the digital era. As part of this, EcoStruxure Machine brings powerful opportunities for machine builders and OEMs, empowering them to offer smart machines and compete in the new, digital era.

EcoStruxure Machine brings together key technologies for product connectivity and edge control on premises, and cloud technologies to provide analytics and digital services. EcoStruxure Machine helps you bring more innovation and added value to your customers throughout the entire machine life cycle.

Innovation at Every Level for Machines is full systems across three layers:

- Connected products
Our connected products for measuring, actuating, device level monitoring, and control adhere to open standards to provide unmatched integration opportunities and flexibility
- Edge Control
We are IIoT-ready with a proven set of tested and validated reference architectures that enable the design of end-to-end open, connected, and interoperable systems based on industry standards. Ethernet and OPC UA facilitates IT/OT convergence meaning machine builders reap benefits from web interfaces and cloud.

- Apps, Analytics & Services
Seamless integration of machines to the IT layer allows the collection and aggregation of data ready for analysis – for machine builders and end users alike this means increased uptime and the ability to find information faster for more efficient operations and maintenance.

These levels are completely integrated from shop floor to top floor. And we have cloud offers and end-to-end cybersecurity wrapped around.

EcoStruxure Machine makes it easier for OEMs/ machine builders to offer their customers smarter machines. The advent of smart machines is driven by the changing needs of end users:

- Evolving workforce
- Reducing costs
- Dynamic markets
- Shorter life cycles
- Prioritizing safety and cybersecurity

EcoStruxure Machine provides one solution for the whole machine life cycle:

- With Smart Design & Engineering the time to market is reduced by up to 30% using our automated engineering and the simulation capabilities
- During Commissioning & Operation of the machine, resources such as energy, material and loss can be improved, and with seamless integration to the IT world efficiency can be improved by up to 40%
- Smart Maintenance & Services reduces the time for corrective actions up to 50%

EcoStruxure™ Machine

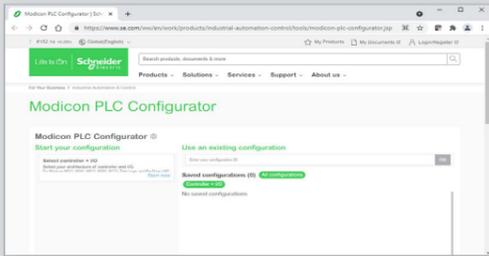


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PacDrive 3

A complete automation solution for motion-centric machines

Controllers for industrial machines

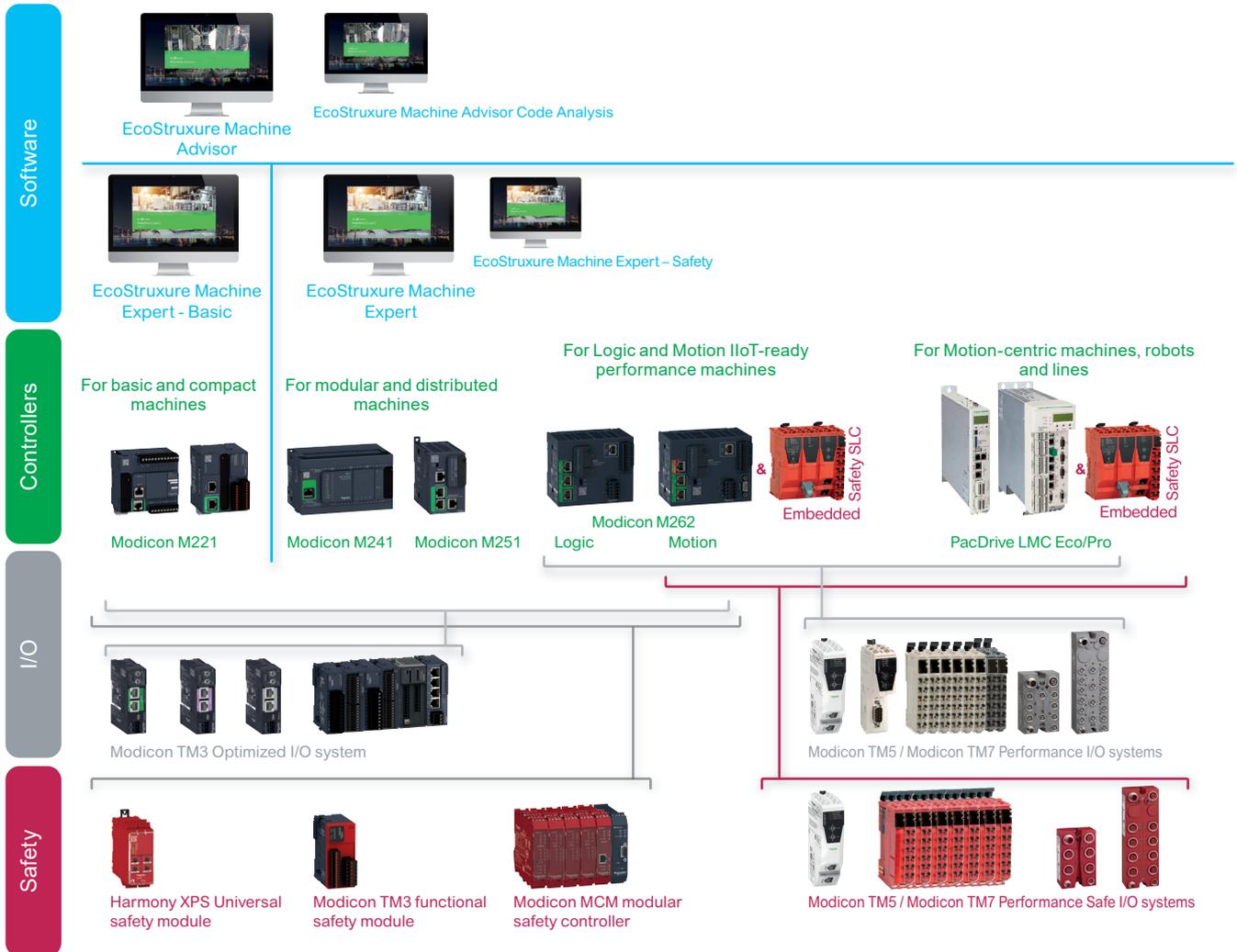
Applications	Type	Logic controller			Logic/motion controller	Motion controller
	Specification	For hardwired architectures	For performance-demanding applications	For modular and distributed architectures	IIoT ready for performance machines	For automating machines/lines with 0 - 130 servo or robot axes
						
Performance		0.2 µs/inst	22 ns/inst	22 ns/inst	3...5 ns/inst	0.5...2 ns/inst
Memory		640 KB RAM, 2 MB Flash	64 MB RAM, 128 MB Flash	64 MB RAM, 128 MB Flash	192 MB RAM, 256 MB Flash	128 KB to 256 KB NV RAM, 512 MB DDR2 to 1 GB DDR3L
Supply voltage		24 V ~ or 100...240 V ~	24 V ~ or 100...240 V ~	24 V ~	24 V ~	24 V ~
Communication fieldbus and networks	Embedded	<ul style="list-style-type: none"> ■ EtherNet/IP Adapter ■ Modbus TCP ■ RS 232/RS 485 Serial Line ■ USB mini-B programming port 	<ul style="list-style-type: none"> ■ EtherNet/IP ■ Modbus TCP ■ CANopen (master) and SAE J1939 ■ Serial Line ■ USB mini-B programming port 	<ul style="list-style-type: none"> ■ EtherNet/IP ■ Modbus TCP ■ CANopen (master) and SAE J1939 ■ Serial Line ■ USB mini-B programming port 	<ul style="list-style-type: none"> ■ EtherNet/IP ■ Modbus TCP ■ Sercos III ■ Serial Line ■ USB mini-B programming port 	<ul style="list-style-type: none"> ■ EtherNet/IP ■ Sercos III ■ CANopen ■ Profibus ■ Profinet ■ EtherCAT
	Optional	<ul style="list-style-type: none"> ■ OPC Unified Architecture (OPC UA) ■ 1 Serial Line 	<ul style="list-style-type: none"> ■ Server ■ Ethernet ■ Profibus DP 	<ul style="list-style-type: none"> ■ Server ■ Ethernet ■ Profibus DP 	<ul style="list-style-type: none"> ■ Server (encrypted) ■ Client (encrypted) (depending on reference) ■ Ethernet, EtherNet/IP Adapter ■ CANopen Master 	<ul style="list-style-type: none"> ■ Server (encrypted) ■ Client (encrypted) ■ CANopen ■ Profibus DP ■ RT-Ethernet
Embedded I/O	Input types	Up to 40 logic inputs 2 analog inputs	Up to 24 logic inputs	–	4 fast digital inputs	Up to 20 digital inputs Up to 16 touch probe inputs Up to 4 interrupt inputs Up to 2 analog inputs
	Output types	Up to 16 relay outputs Up to 16 transistor outputs	Up to 16 transistor outputs	–	4 fast digital outputs	Up to 16 digital outputs Up to 2 analog outputs
Synchronized axes		–	–	–	Up to 24 synchronized axes	Up to 130 synchronized axes
Configuration software		EcoStruxure Machine Expert-Basic	EcoStruxure Machine Expert			
Compatible expansion I/O module ranges (Consult catalog)	Local I/O	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	–
	Remote I/O	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	–
	Distributed I/O on Ethernet	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN) ● Modicon TM5 (DIA3ED2131204EN)	● Modicon TM3 (DIA3ED2140109EN) ● Modicon TM5 (DIA3ED2131204EN)	● Modicon TM3 (DIA3ED2140109EN) ● Modicon TM5 (DIA3ED2131204EN)	● Modicon TM5 (DIA3ED2131204EN)
	Distributed I/O on CANopen	–	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN) ● Modicon TM5 (DIA3ED2131204EN) ● Modicon TM7 (DIA3ED2140405EN)	● Modicon TM3 (DIA3ED2140109EN) ● Modicon TM5 (DIA3ED2131204EN) ● Modicon TM7 (DIA3ED2140405EN)
	Distributed I/O on Sercos	–	–	–	● Modicon TM5 (DIA3ED2131204EN)	● Modicon TM5 (DIA3ED2131204EN)
	Distributed I/O on Modbus Serial Line	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	–
Safety I/O	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN) ● Modicon TM5 (DIA3ED2131204EN) ● Modicon TM7 (DIA3ED2140405EN)	● Modicon TM5 (DIA3ED2131204EN) ● Modicon TM7 (DIA3ED2140405EN)	
Controller range		Modicon M221/M221 Book	Modicon M241	Modicon M251	Modicon M262	PacDrive LMC Eco, LMC Pro2
More details on our website	Consult the catalogs	DIA3ED2140106EN	DIA3ED2140107EN	DIA3ED2140108EN	DIA3ED2180503EN	DIA7ED2160303EN
	Try the configuration tool	 <p>Modicon PLC configurator</p> <ul style="list-style-type: none"> > Select your architecture of controller and I/O by - Usage and application - Connectivity, services and IIOT (Protocols, Web and communication services) - I/O and power supply 				

PacDrive 3

A complete automation solution for motion-centric machines

Machine Automation

Machine Automation



Machine control

The scalability and consistency of I/O ranges allow you to select the right offer depending on your needs

Embedded Safety provides holistic solutions to Modicon M262 and PacDrive 3 LMC controllers, increasing overall safety demand in Machine Automation

All of those devices are managed within a single software, **EcoStruxure Machine Expert**, a powerful and collaborative engineering environment

- > From basic to motion- and robot-centric machines with the PacDrive 3 offer, Modicon controllers and solutions bring a consistent and scalable response to achieving flexibility, performance, productivity and digitization.
- > Modicon TM3 Optimized I/O system for more compact and modular machines
- > Modicon TM5 for more performance-demanding machines, with Modicon TM7 for harsh environments: Both Performance I/O ranges (Modicon TM5 and Modicon TM7) allow safety functions to be implemented using Modicon TM5CSLC safety logic controller
- > Harmony XPS Universal safety modules cover a wide range of safety functions, suitable for small applications with 4-5 safety functions, with diagnostic information provided to controllers via a single wire connection
- > Modicon TM3 safety functional modules are suitable for small applications covering E-Stop functions and diagnostics via TM3 I/O bus
- > Modicon MCM modular safety controllers are suitable for medium size applications with up to 64 dual channel safety functions and diagnostics via Modbus TCP, Modbus RTU, EtherNet/IP, CANopen, EtherCAT and Profibus
- > EcoStruxure Machine Expert – Safety: an optional add-on for programming safety logic controllers
- > EcoStruxure Machine Expert – Basic: a software for programming Modicon M221 logic controllers, an intuitive standalone environment accessible to basic skilled technicians
- > EcoStruxure Machine Advisor: a cloud-based services platform designed for machine builders to track machines in operation worldwide, monitor performance data and resolve exceptional events, while reducing support costs by up to 50%

PacDrive 3

A complete automation solution for motion-centric machines

Machine Automation

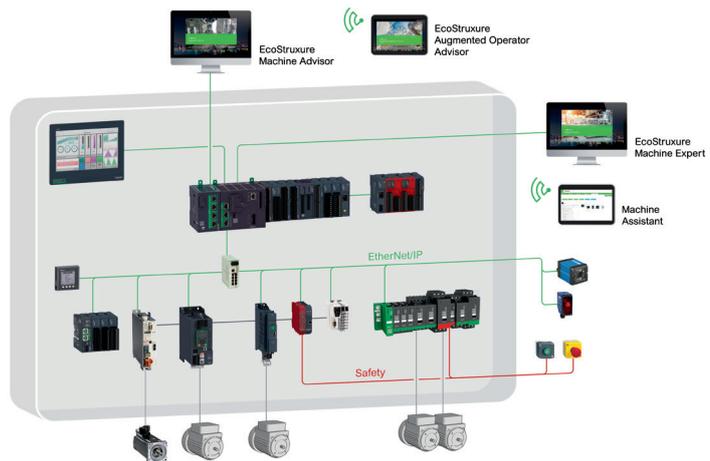
Machine Automation

Comprehensive Schneider offers for machine builders

- > Lexium servo drives, motors and robotics are designed to control applications ranging from a single independent axis up to high-performance synchronized multi-axis machines requiring high-speed and precise positioning and movements



- > The Lexium offer is designed for a broad range of motion-centric machines in applications such as [Packaging](#), [Material Handling](#), [Material Working](#), [Food and Beverage](#) and Electronics
- > Schneider Electric has developed Tested Validated & Documented Architectures (TVDA) applicable for generic machine control applications as well as for dedicated segment applications such as Packaging, Material Working, Material Handling, Hoisting, Pumping, or generic [Machine Control applications](#)



Choose Schneider Electric to help secure your investment and benefit from worldwide services at every step of your project



- > From planning and inception to modernization, we help ensure optimal technical and business performance. Our field service engineers combine 30+ years of manufacturer-level experience with the latest technology to bring innovation to every level of our offer and every step of your project.
- > Our machine control dedicated services empower you to maximize your business infrastructure and face increasingly stringent demands on productivity, safety, equipment availability and performance optimization.

PacDrive 3

A complete automation solution for motion-centric machines

An integrated system's approach, Scalable controller performance

An integrated system's approach

One controller for the entire machine

PacDrive 3 is based upon proven logic motion technology, which 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.



- > Single controller solution for motion, PLC logic, and communication
- > Centralized calculation of all axis positions within the controller, allowing the controller to switch on the fly from real to virtual axes. Enables motion testing/simulation without connecting drives/motors
- > Standard parameterization of each axis, configuration of individual drives requires only input of inertia for each load
- > Electronic type plates for all servo drives/motors, detailed communication with each drive/motor for automatic parameterization and firmware replication (all data are centrally stored in the controller) and diagnosis
- > Maximum scalability: Modular machines can be configured easily. The controller recognizes all connected drives/motors and can activate/deactivate them automatically based upon the modules connected to the machine

Scalable controller performance

Controllers for automating both simple and complex machines



Logic Motion Controllers LMC Eco/Pro2, Consult catalog ref. [DIA7ED2160303EN](#)

PacDrive 3 LMC controllers provide scalable performance for synchronizing up to 130 servo axes at 1 msec network update rate and for up to 255 virtual axes. In addition to motion functionality, all controllers combine an integrated PLC, HMI interfaces, and IT functionalities on a single hardware platform.

The PacDrive controller series deliver full scalability, from small applications with a few servo axes to complex, high-performance systems:

- > PacDrive **LMC Eco** series for up to **16** synchronized servo axes
- > PacDrive **LMC Pro2** series for up to **130** synchronized servo axes

Integrated robots can lower the number of axes depending upon kinematics and complexity of operation.

In addition, the controller can synchronize up to 255 virtual axes. The network update rate for all axes is 1msec. All controllers are software-compatible, since all have identical Schneider Electric Logic Motion Runtime software.

The PacDrive LMC controllers are equipped with integrated digital and/or analog I/Os (depending on model). The controllers include both standard and high-speed I/Os (touch probes) for significantly faster response to events recorded by sensors (such as motion-relevant signals). External I/Os can also be added with a Sercos bus coupler for the modular Modicon TM5/TM7 I/O solution.

PacDrive 3

A complete automation solution for motion-centric machines

Sercos automation bus , Open communication standards, Embedded Safety

Sercos automation bus

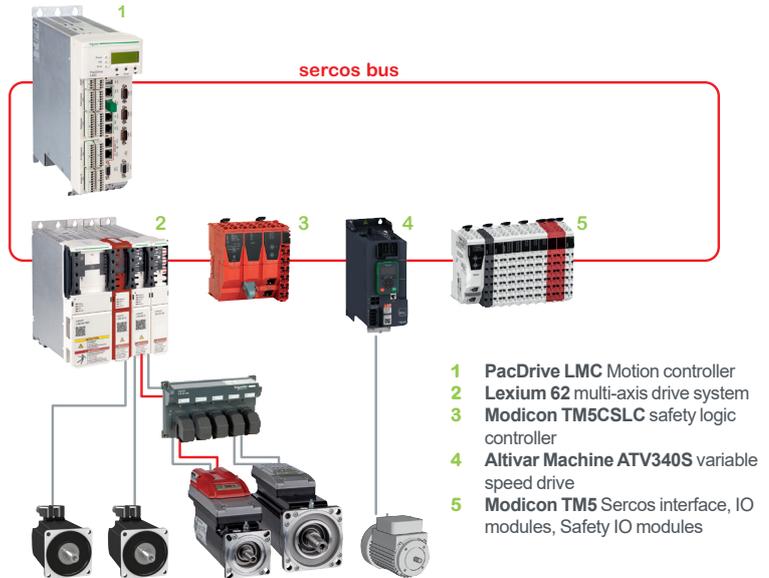
Sercos
the automation bus

- Cat 5e
- Baudrate: 100 Mbps
- Cycle time: 1...4 ms

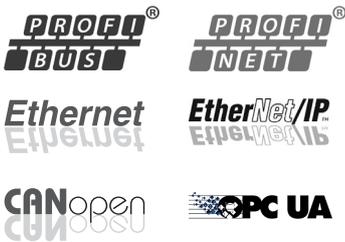
Sercos – an Ethernet-based automation bus

Sercos is the automation bus used with PacDrive LMC Eco/Pro2 motion controllers. The complete system components for managing a machine including controllers, drives, IOs, variable speed drives, safety controller and safety IOs are combined on a single Sercos Ethernet network. The Sercos bus can be wired in a line or ring topology.

In parallel to communication on field level, Sercos can be used for controller to controller on line level. This ensures precise synchronisation of different machines, coupled in high-speed processes for example.



Open communication standards

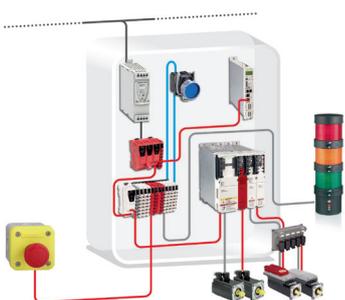


Fieldbus standards and web protocols

PacDrive is an open technology, which includes open communication standards. In addition to the default integrated interfaces, PacDrive controllers can communicate using the most common fieldbus and RT-Ethernet standards.

- > Sercos is the preferred automation bus for PacDrive solutions, while CANopen is an alternative for I/O communication for simple machines. Each PacDrive controller has a CANopen interface as well as a standard Ethernet interface
- > In addition to communication via Sercos and Ethernet, LMC Pro2 series controllers can communicate simultaneously via two fieldbus protocols and real-time Ethernet, e.g. CAN and Profinet
- > Optional expansion cards are also available for all controllers to implement additional fieldbus interfaces such as EtherNet/IP. The LMC Pro2 series controllers also have a Profibus DP interface (master and slave)
- > All current web protocols for vertical integration/remote control have been integrated, e.g. OPC UA, HTTP, FTP
- > Web visualization is available for remote access

Embedded Safety



Example of Safety architecture with Modicon TM5CSLC Safety logic controller, Modicon TM5 safety & non-safety expansion modules, integrated drives and safety module for a safe communication over Sercos automation bus.

Embedded safety solutions

PacDrive's embedded safety solution is a scalable distributed architecture solution able to mix Safety and non-safe IO within IO islands, safety drives within the Lexium 62 ILM integrated servo drives rack as well as optional module dedicated to the Lexium 62 ILM motors.

The solution is certified up to SIL 3 of EN/IEC 61508, and performance level "e" Category 4 EN ISO 13849-1.

Depending on the hardware configuration the following safety functions can be implemented: STO, SS1, SS2, SOS, SLS, SDI, SMS, all via Sercos bus.

PacDrive 3

A complete automation solution for motion-centric machines

Flexible servo drive design

Flexible servo drive design

Increasing control cabinet space requirements and rising costs for mounting and cabling are key factors driving the design of new servo solutions. At the same time, there is still a need for classic single-axis servo solutions. No single solution can fully satisfy both of these needs.

This is why the Lexium servo system for PacDrive proposes:

- > a Lexium 52 stand-alone-axis solution,
- > a Lexium 62 multi-axis solution,
- > a Lexium 62 ILM integrated servo drive solution,
- > a Lexium 62 ILD detached servo drive solution.

Those servo drives are fully software-compatible and can work side by side in mixed configurations.

Lexium 52 stand-alone servo drive

- > In a conventional stand-alone design with integrated 3-phase power supply, Lexium 52 series drives are particularly well suited for economical configuration of servo drive solutions with self-contained single axes. They communicate via Sercos and offer embedded digital I/O. The servo drives are available in five different power levels, ranging from 1.5 to 24 A continuous current and 6 to 72 A peak current.
- > Lexium 52 is ideal for solutions with a small number of axes and is fully compatible with the “smaller” PacDrive Eco controllers.



Lexium 52 stand-alone servo drive, consult catalog ref. [DIA7ED2160304EN](#)

Lexium 62 multi-axis drive system

- > The Lexium 62 series drives consist of single drives (1 axis) and double drives (2 axes) of the same size. All of the single and double drives within a group share a single power supply. No backplane connections are required, and the modules can be coupled to the adjacent module in less than two minutes through a quick front connection with locking I/O. The servo drives are available in five different power levels, ranging from 1.5 to 24 A continuous current and 6 to 72 A peak current.
- > The multi-axis cabinet-based Lexium 62 requires up to 50% less cabinet space compared to other solutions on the market.



Lexium 62 multi-axis drive system, consult catalog ref. [DIA7ED2160305EN](#)

Standard and stainless servo motors

- > Dynamic, highly efficient servo motors form the basis for every modern servo solution. The Lexium SH3, MH3, and SHS stainless steel servo motors cover a wide range of performance and flange sizes.
- > All motors are equipped with electronic type plates and are optimized for use with Lexium 52 and Lexium 62 cabinet servo drives.



Lexium SH3, Lexium MH3 and Lexium SHS Servo motors, consult catalog ref. [DIA7ED2160308EN](#)

Lexium 62 ILM integrated servo drive

- > Lexium 62 ILM servo drives with integrated drive electronics incorporate a flexible approach to cabling, with prefabricated hybrid cables and distribution boxes. The only elements remaining in the cabinet are the shared power supply for the Lexium 62 series and a connection module. The drive and network solution together form a true plug-and-play solution. The range of network topologies available includes line, tree, and daisy chain, all topologies either alone or mixed.
- > Lexium 62 ILM Integrated servo drives are the key element in consistent modular machine design.
- > The Lexium 62 ILM requires up to 90% less cabinet space when compared to stand-alone drives, and wiring/installation times in the cabinet can be reduced by up to 90%.



Lexium 62 ILM integrated servo drive, consult catalog ref. [DIA7ED2160306EN](#)

Lexium 62 ILD detached servo drives

- > The Lexium 62 ILD detached servo drives consist of single drives (1 axis) and triple drives (3 axes).
- > The Lexium 62 ILD detached servo drives are fully integrated in the Lexium 62 ILM network infrastructure and support as well the strategy of cabinetless automation. In opposite to Lexium 62 ILM the IP 65 rated drives can be combined like Lexium 62 cabinet drives with Lexium SH3 and MH3 motors (up to a rated current of 6 A).
- > The more they are suited for operating AC motors.



Lexium 62 ILD detached servo drives, consult catalog ref. [DIA3ED2161202EN](#)

PacDrive 3

A complete automation solution for motion-centric machines

Embedded robotic solutions, Related products

Embedded robotic solutions



Lexium T & P Delta robots,
consult catalog ref. [DIA3ED2160307EN](#)



Lexium PAS and Lexium MAX Cartesian robots,
consult catalog ref. [DIA7ED2210101EN](#)



Lexium MC12 multi carrier,
consult catalog ref. [DIA7ED2210701EN](#)

The integration of robotic into the machine control solution is one of the outstanding features of PacDrive: Robot kinematics with up to 6 axes are equipped with Lexium SH3 servo motors, and can be fully integrated into the PacDrive 3 automation solution. Standard Lexium servo drives or integrated servo drives can be used, and thanks to library functions, the robot(s) can be integrated into the IEC 61131-3-compliant machine program structures.

Ready-to-use robotic packages

- > With the availability of complete robot arm mechanisms, there is no longer any need to develop customer-specific kinematics or integrate third-party products. This allows faster creation of robot-enabled machine designs.
- > Robotic portfolio
 - > Delta 2 and Delta 3 picker mechanisms designed for fast pick-and-place solutions,
 - > Cartesian system providing individual solutions for portal and gantry robots,
 - > Lexium MC12 multi carrier, an innovative transport system using latest linear motion technology for moving, positioning or grouping objects in machines for discrete processes.

Universal use of PacDrive robotic software library

- > Appropriate transformation modules incorporate all typical kinematics into the controller software, whether it involves PacDrive robotics or customized kinematics.
- > In addition to transformation modules mapped to the Lexium T & P Delta robots, Lexium PAS and MAX cartesian kinematics, and Lexium MC12 multi carrier transport system, a universal transformation module is also available for custom-designed or third-party kinematics, and allows various robots to be controlled with PacDrive controllers.

Integration of vision systems with library functions

- > Vision systems are typically a fundamental element in robotics solutions. An open vision library allows many of the vision systems available on the market to be quickly integrated into a solution. Cognex vision solutions in particular are fully supported.

Related products



Motor control, Positioning



Measuring, recording,
switching devices



HMI, Dialogue and control
devices



Mounting and powering

Your one-stop shop from simple control systems to global automation solutions

Schneider Electric offers a full range of products (1) and solutions for energy distribution & management and for industrial automation.

From actuators to control systems, we have the products to complete your PacDrive 3 automation solution.

Please visit on our website, to find the following product:

- > [Motor control](#) and [Motor-starters](#)
- > [Variable speed drives](#), [Steppers Drives and Motors](#)
- > [HMI](#)
- > [Control stations](#) and [Pushbuttons](#), [Emergency switches](#), [Dialog and signaling devices](#) (also for safety solutions)
- > [Measuring, recording, switching: Optoelectronic, Inductive, Ultrasound switches and sensors](#), [Recording systems \(also for safety solutions\)](#)
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PacDrive 3

A complete automation solution for motion-centric machines

Reduce your time to market, EcoStruxure Machine Expert Software

Reduce your time to market



EcoStruxure Machine Expert software



Consult catalog ref. [DIA3ED2180701EN](#)

EcoStruxure Machine Expert – a single software for engineering, commissioning, and diagnostics

EcoStruxure™ Machine Expert is an integrated software environment for all aspects of your machine engineering process with PacDrive.

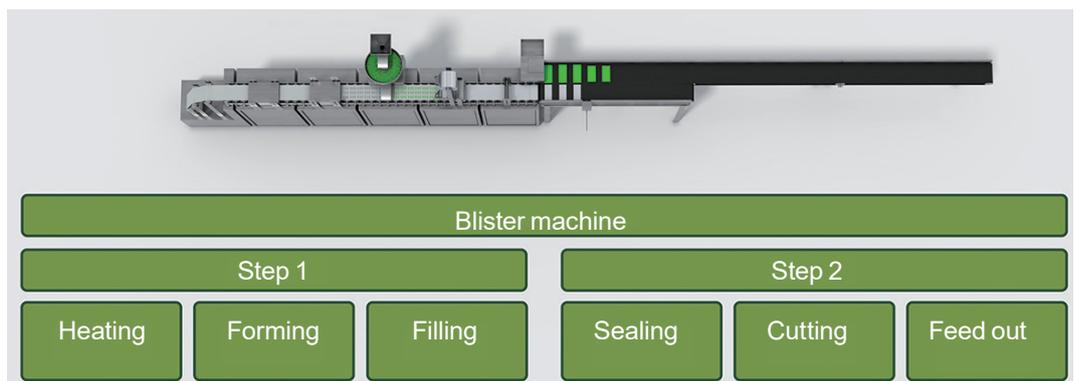
EcoStruxure Machine Expert (1) guides you in every phase of your project: planning, sizing and selection, programming, commissioning, diagnosis, and maintenance. Functionalities such as diagnostics, fast device replacement, and motion design are deeply embedded in the tools, making them highly efficient. PacDrive LMC controllers are programmed in compliance with the IEC-61131-3 standard, with object-oriented extensions. Devices are configured using a powerful parameter concept.

Library functions and template-based programming



Shorten your engineering time with ready-to-use modular software solutions that have been extensively tested and successfully deployed in many machines. PacDrive libraries provide software functionality in the form of classic function blocks (AFBs = Application Function Blocks) and Equipment Modules (EMs). AFBs and EMs allow you to build scalable, modular project architectures, thus reducing engineering times.

AFBs are supplied for many basic common automation tasks and machine functionalities. AFBs can be parameterized to perform a variety of common tasks in a motion-centric machine – with no programming required.



Equipment Modules add a standardized interface and behavior for command processing, operation modes, exception handling, and logging – on top of the functionality provided by AFBs. EMs consist of one or more combined AFBs. Equipment Modules for typical machine parts include: Axis Module (combining AFBs for homing, jogging, endless, positioning, and cam functions), Crank, Multibelt, Robotic, Smart Infeed, Unwinder, and Intelligent Line Shaft. Equipment Modules were developed to pave the way for programming with the PacDrive Template, a standardized project architecture. This template is available in EcoStruxure Machine Expert, along with sample projects adapted to individual applications for an easier design process. The PacDrive Template architecture includes communication with the HMI, machine level command processing, operation mode management (optionally compliant with PackML ISA-TR.00.02), exception handling, and logging.

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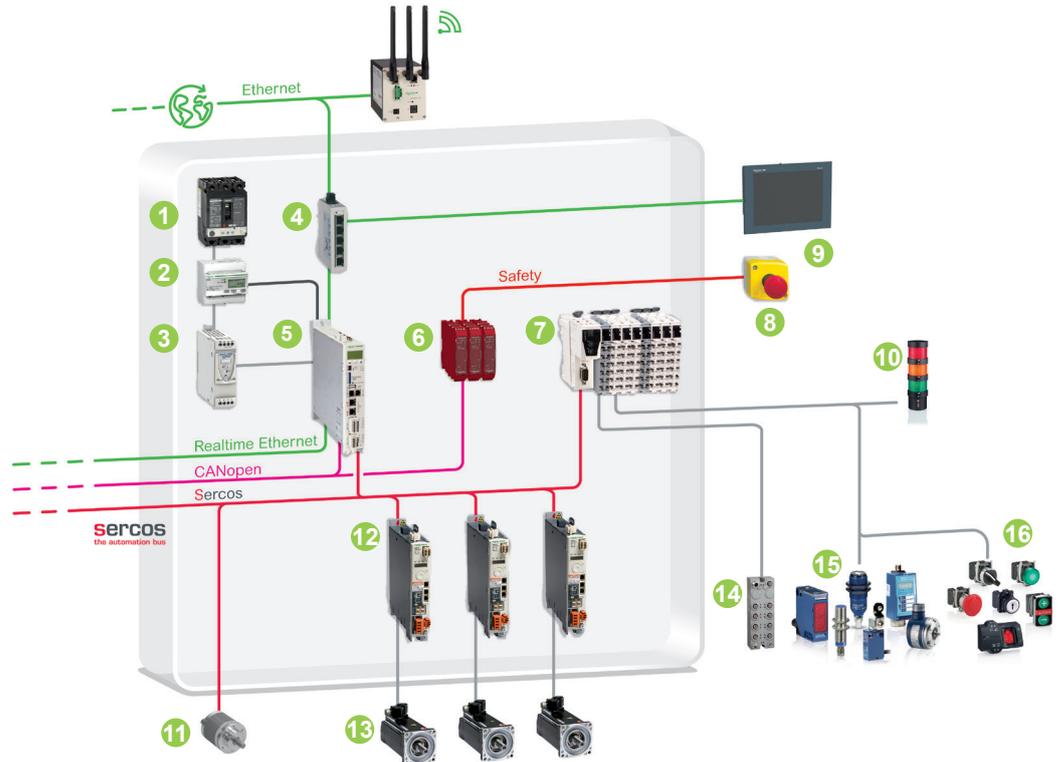
A complete automation solution for motion-centric machines

Automation architectures for high performance motion

Example of automation architecture

For machine/motion control solutions with 0-4 servo axes

 Compact architecture with hardwired safety solution, suitable for machines with small number of servo axes



Synchronized axes / Sercos / Motion controller **PacDrive LMC101**

Solution breakdown (1)

- | | |
|---|--|
| <ul style="list-style-type: none"> 1 Compact NSX Circuit breaker 2 IEM32 Energy meter 3 Modicon Switch mode power supply 4 Modicon Switch Ethernet 5 PacDrive LMC101 Motion controller 6 Modicon MCM Safety modular controller 7 Modicon TM5 (IP 20): Sercos interface module, Expansion module 8 Harmony XALK Emergency stop 9 Harmony HMI Small Panels | <ul style="list-style-type: none"> 10 Harmony XV Signaling unit 11 3rd party product: encoder 12 Lexium 52 stand alone servo drive 13 Lexium SH/MH Servo motors series 14 Modicon TM7 IP 67 Expansion module 15 Telemecanique Sensors (2): Proximity and Photoelectric sensors, Limit and Pressure switches, Encoder 16 Harmony XB4/XB5 Control units, Harmony XB5 Biometric switches |
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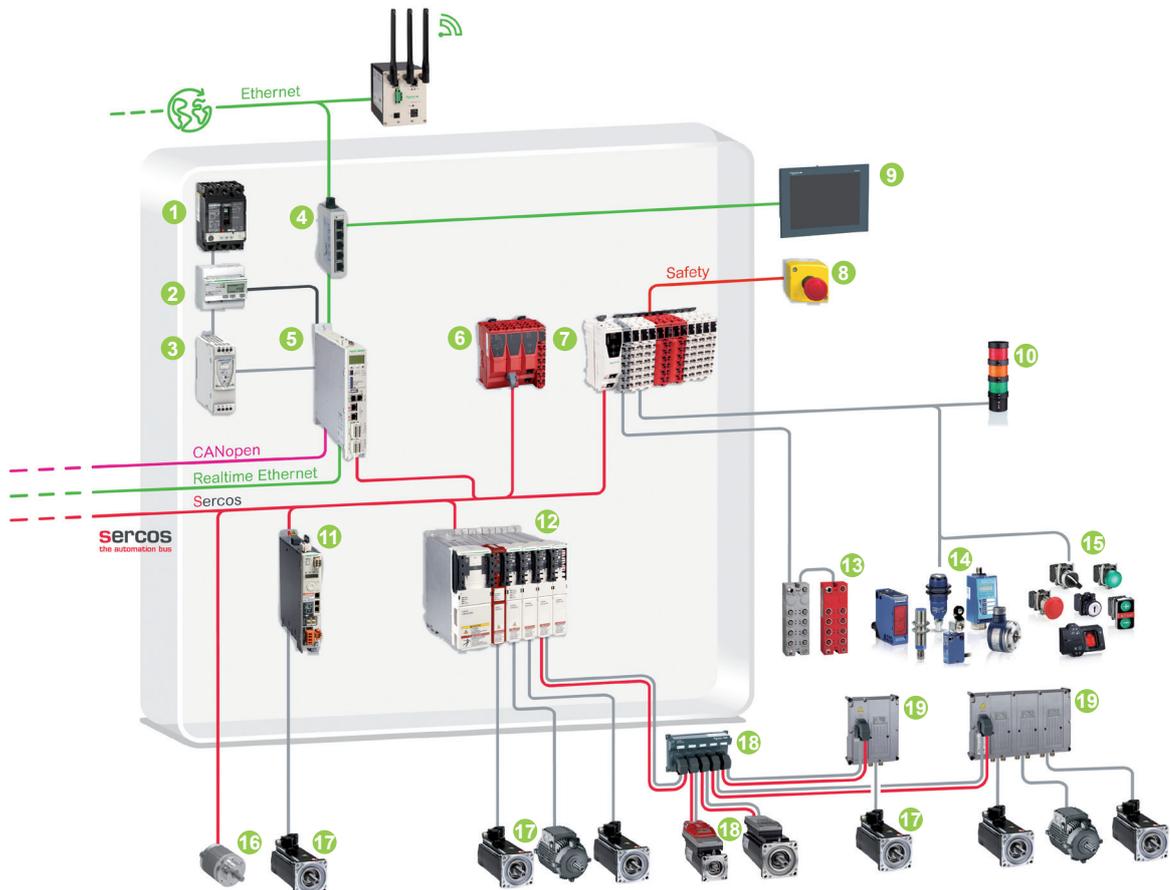
A complete automation solution for motion-centric machines

Automation architectures for high performance motion

Example of automation architecture

For machine/motion control solutions with up to 16 servo axes

✓ Scalable solution, suitable for automating a wide range of packaging machines and handling solutions



Synchronized axes / Sercos / Motion controller **PacDrive LMC216**

Solution breakdown (1)

- 1 Compact NSX Circuit breaker
- 2 IEM32 Energy meter
- 3 Modicon Switch mode power supply
- 4 Modicon Switch Ethernet
- 5 PacDrive LMC216 Motion controller
- 6 Modicon TM5CSLC Safety logic controller
- 7 Modicon TM5 (IP 20): Sercos interface module, Safety expansion module, Expansion module
- 8 Harmony XALK Emergency stop
- 9 Harmony HMI Small Panels
- 10 Harmony XV Signaling units
- 11 Lexium 52 stand alone servo drive
- 12 Lexium 62 multi-axis drive system: Power supply, Servo drives, Servo drives with embedded safety
- 13 Modicon TM7: IP 67 Expansion module, IP 67 Safety expansion module
- 14 Telemecanique Sensors (2): Proximity and Photoelectric sensors, Limit and Pressure switches, Encoder
- 15 Harmony XB4/XB5 Control units, Harmony XB5S Biometric switches
- 16 3rd party product: encoder
- 17 Lexium SH/MH Servo motors series
- 18 Lexium 62 ILM Integrated servo drives: Connection module, Distribution boxes, Integrated servo drives, I/O and Safety optional modules
- 19 Lexium 62 ILD detached servo drives: single drive, triple drive



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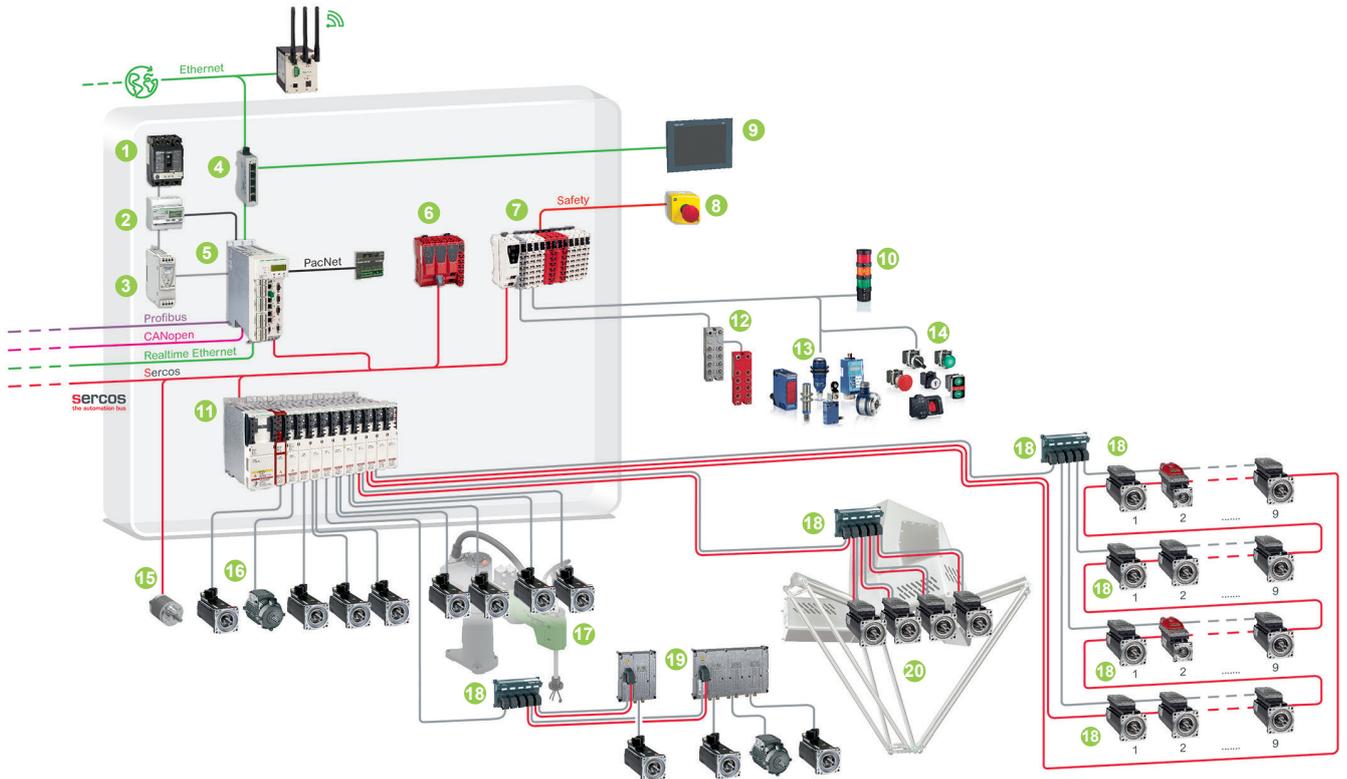
A complete automation solution for motion-centric machines

Automation architectures for high performance motion

Example of automation architecture

For machines/motion control solutions with up to 99 / 130 servo axes including robots

 Scalable automation architecture, suitable for demanding packaging machines, picker lines, and other applications with servo motors



Synchronized axes & robots / Sercos / Motion controller **PacDrive LMC802** for higher requirements

Solution breakdown (1)

- 1 Compact NSX Circuit breaker
- 2 IEM32 Energy meter
- 3 Modicon Switch mode power supply
- 4 Modicon Switch Ethernet
- 5 PacDrive LMC800 Motion controller, PacNet fast I/O module
- 6 Modicon TM5CSLC Safety logic controller
- 7 Modicon TM5 (IP 20): Sercos interface module, Safety expansion module, Expansion module
- 8 Harmony XALK Emergency stop
- 9 Harmony HMI Small Panels
- 10 Harmony XV Signaling units
- 11 Lexium 62 multi-axis drive system: Power supply, Servo drives, Servo drives with embedded safety
- 12 Modicon TM7: IP 67 Expansion module, IP 67 Safety expansion module
- 13 Telemecanique Sensors (2): Proximity and Photoelectric sensors, Limit and Pressure switches, Encoder
- 14 Harmony XB4/XB5 Control units, Harmony XB5S Biometric switches
- 15 3rd party product: encoder
- 16 Lexium SH/MH Servo motors series
- 17 SCARA robots
- 18 Lexium 62 ILM Integrated servo drives: Connection module, Distribution boxes, Integrated servo drives, I/O and Safety optional modules
- 19 Lexium 62 ILD detached servo drives: single drive, triple drive
- 20 Lexium T, P Delta robots



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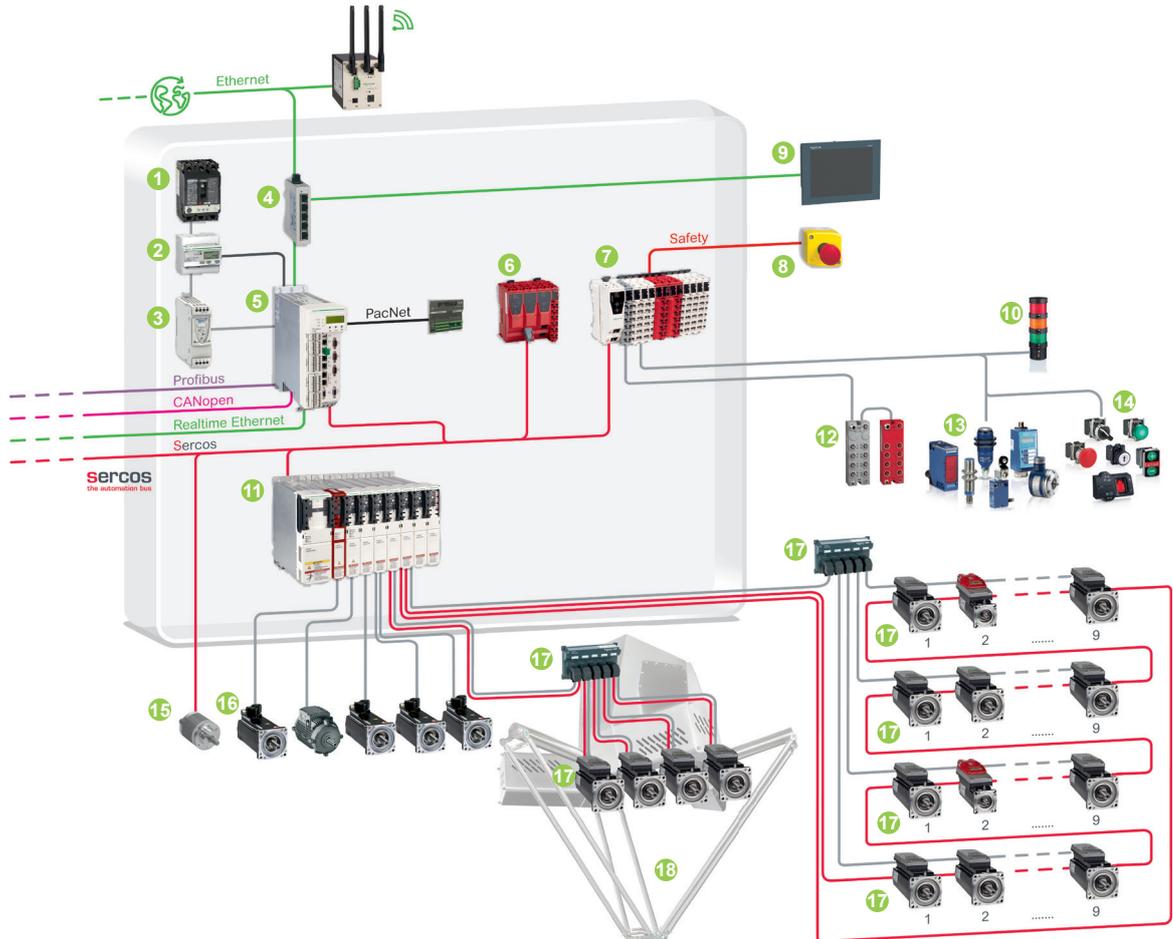
A complete automation solution for motion-centric machines

Automation architectures for high performance motion

Example of automation architecture

For machines/motion control solutions with up to 99 / 130 servo axes including robots

 Scalable automation architecture, suitable for demanding packaging machines, picker lines, and other applications with servo motors



Synchronized axes & robots / Sercos / Motion controller PacDrive LMC802 for higher requirements

Solution breakdown (1)

- 1 Compact NSX Circuit breaker
- 2 IEM32 Energy meter
- 3 Modicon Switch mode power supply
- 4 Modicon Switch Ethernet
- 5 PacDrive LMC800 Motion controller, PacNet fast I/O module
- 6 Modicon TM5CSLC Safety logic controller
- 7 Modicon TM5 (IP 20): Sercos interface module, Safety expansion module, Expansion module
- 8 Harmony XALK Emergency stop
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- 10 Harmony XV Signaling units
- 11 Lexium 62 multi-axis drive system: Power supply, Servo drives, Servo drives with embedded safety
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- 18 Lexium T, P Delta robots



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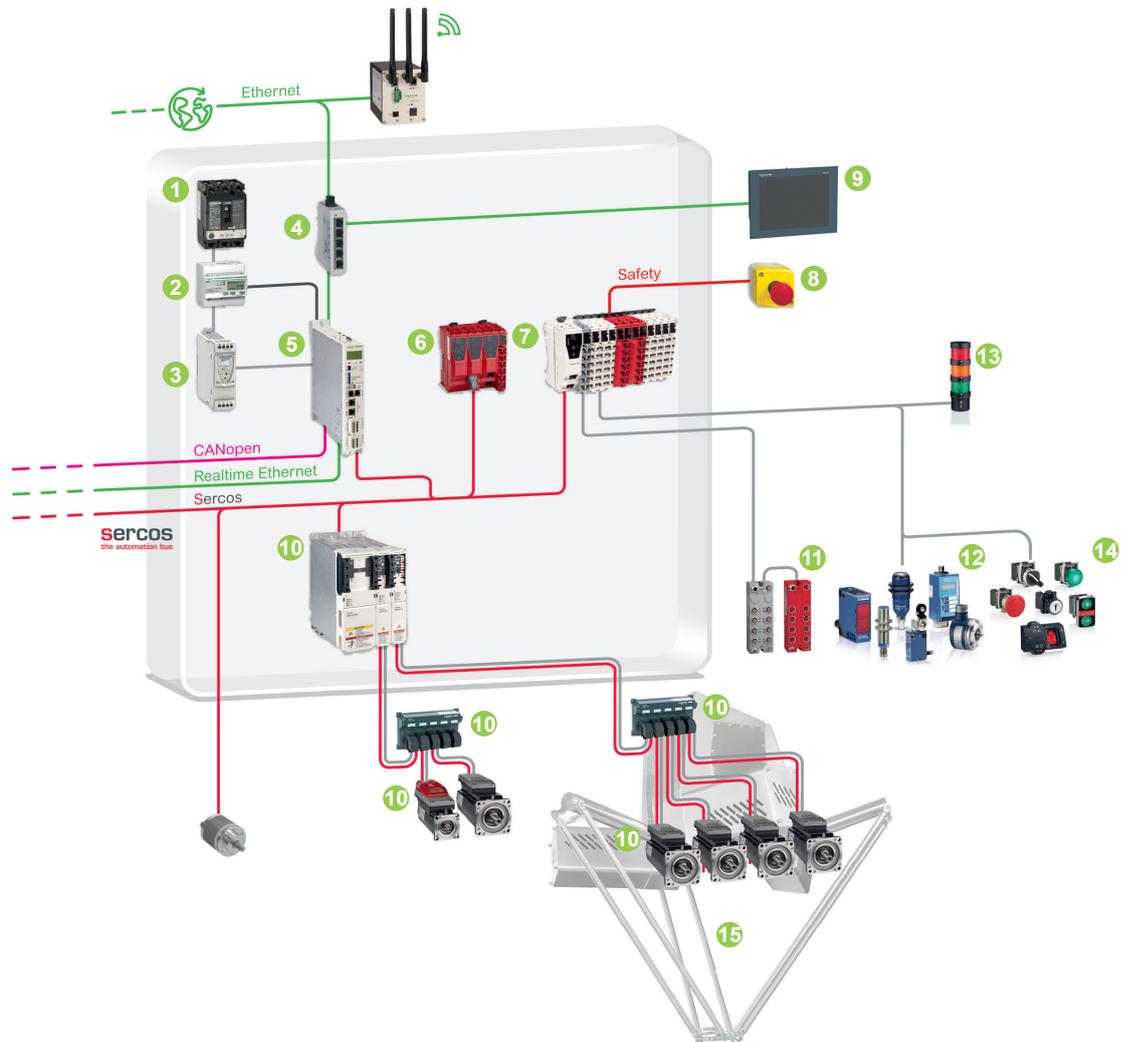
A complete automation solution for motion-centric machines

Automation architectures for high performance motion

Example of automation architecture

For robot cells/portal robots: 1 robot, feed-in, feed-out

✓ Flexible, adaptable automation architecture for designing typical standardized robot cells: robot (Delta 3, cartesian ...), feed-in, feed-out



Robots / Sercos / Motion controller **PacDrive LMC106**

Solution breakdown (1)

- 1 Compact NSX Circuit breaker
- 2 IEM32 Energy meter
- 3 Modicon Switch mode power supply
- 4 Modicon Switch Ethernet
- 5 PacDrive LMC106 Motion controller
- 6 Modicon TM5CSLC Safety logic controller
- 7 Modicon TM5 (IP 20): Sercos interface module, Safety expansion module, Expansion module
- 8 Harmony XALK Emergency stop
- 9 Harmony HMI Small Panels
- 10 Lexium 62 ILM Integrated servo drives: Connection module, Distribution boxes, Integrated servo drives, I/O optional modules
- 11 Modicon TM7: IP 67 Expansion module, IP 67 Safety expansion module
- 12 Harmony XB4/XB5 Control units, Harmony XB5S Biometric switches
- 13 Harmony XV Signaling units
- 14 Telemecanique Sensors (2): Proximity and Photoelectric sensors, Limit and Pressure switches, Encoder
- 15 Lexium T, P Delta robots



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PacDrive 3

A complete automation solution for motion-centric machines

Focus on packaging and handling processes

Focus on packaging and handling processes



Packaging process with Delta robots



Automated handling with Cartesian robots

Expertise across the entire packaging process

Schneider Electric is one of the leading companies in packaging automation worldwide.

- > As a pioneering member of OMAC, Schneider Electric has been active for many years in the OMAC Packaging Workgroup. Schneider Electric has also implemented the guidelines of the Weihenstephan Standard, which is becoming increasingly important for the vertical integration of data streams generated from packaging lines. Today, more than 80,000 machines worldwide are automated using the PacDrive platform. Everything is possible, from simple positioning applications up to 130 synchronous driven servo axes or integrated robots.
- > To save time and enhance quality, machines can be automated with matching, ready-to-use library software modules such as Multibelt, Winder/Unwinder, Printmark Detection, Sealing, and so on. The template-based software strategy was developed for more complex applications, and supports the trend towards the use of modular machines in packaging automation by offering standardized, reusable machine programs.

Automated handling : solutions including mechatronics

- > In automated handling, solutions including mechatronics handling, Schneider Electric has taken its solutions far beyond basic technologies. PacDrive can serve as the hardware basis for a large number of conveying and handling requirements. The PacDrive software libraries offer ready-to-use software modules for many typical tasks such as conveying, feeding, separation, or infeed.
- > Example of architectures and library functions also simplify implementation for demanding applications. Linear motion axes, cartesian robots, and Delta picker robots are of particular interest. These functions can be used for stainless steel robots in hygienic designs, Schneider Electric offers complete solutions: hardware, software, and mechatronics – plus services.
- > These robots can be used for material handling solutions such as buffers for small load carriers or sorting systems in the beverage industry.

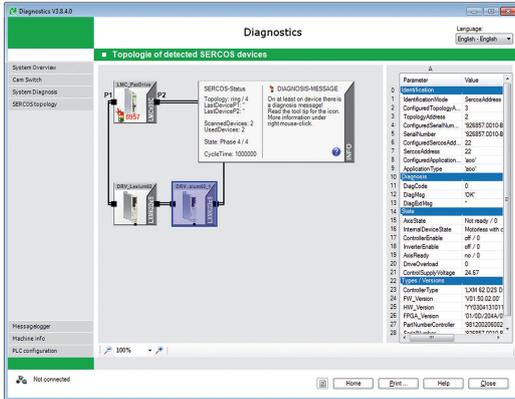
PacDrive 3

A complete automation solution for motion-centric machines

Simplify integration & maintenance

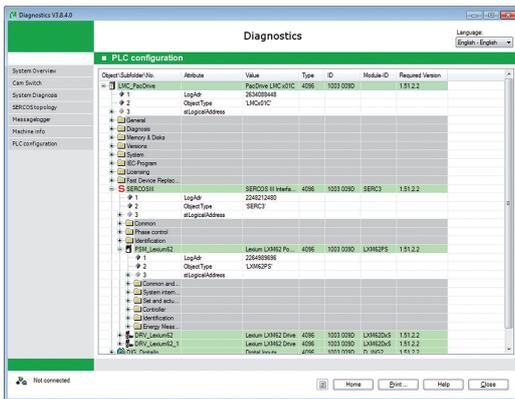
Simplify integration and maintenance

PacDrive’s digital system architecture is based upon the concept of a centralized controller. All system functions run through the centralized controller, from the human-machine interface to motion and device bus communication, line synchronization, and vertical integration. This approach creates far-reaching possibilities for diagnostics, easy firmware handling, and automatic parameterization of replacement components.



Maintenance tools

- > The Logic Builder in EcoStruxure Machine Expert offers extensive diagnostic functionalities throughout a PacDrive-based automation system. Sercos scan can be used to detect all core components and maintain firmware version compatibility in drives or motors. An integrated software oscilloscope permits simultaneous plotting of 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 diagnostics messages.
- > Backup data, system data and, firmware updates for the controller can be managed with the Controller Assistant. The Drive Assistant is an easy-to-use tool for direct updates of firmware in Sercos slaves.
- > Diagnostics was developed for local use during normal operations. This stand-alone tool can be run as a single program on a PC, without the need for an additional EcoStruxure Machine Expert workbench. Diagnostics provides a snapshot of a machine’s current status, including loggers, device parameters, I/O status, graphical architecture view of the Sercos network, and more. Diagnostics contains almost the same functionalities as the programming and commissioning tool for engineering, without the risk of unintended changes to the machine program.



Fast device 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 with plug-and-play technology.
- > Parameterization of the replacement components via laptop or software installation is no longer required. The centralized PacDrive controller detects the replacement components or motors based upon their electronic type 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 retrieves updates when the equipment is replaced.

Remote maintenance

PacDrive provides the interfaces and/or protocols needed for remote maintenance via the Internet, modem, and mobile telecommunications. Schneider Electric provides advice and support to machine users and machine builders for integration of the most practical options – worldwide.

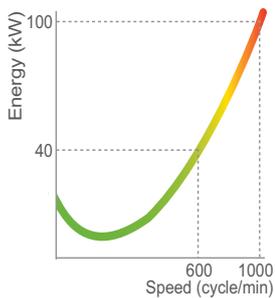


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Energy efficiency

Energy efficiency



Measure the energy consumption of a running machine compared to the output and calculate the optimal ratio

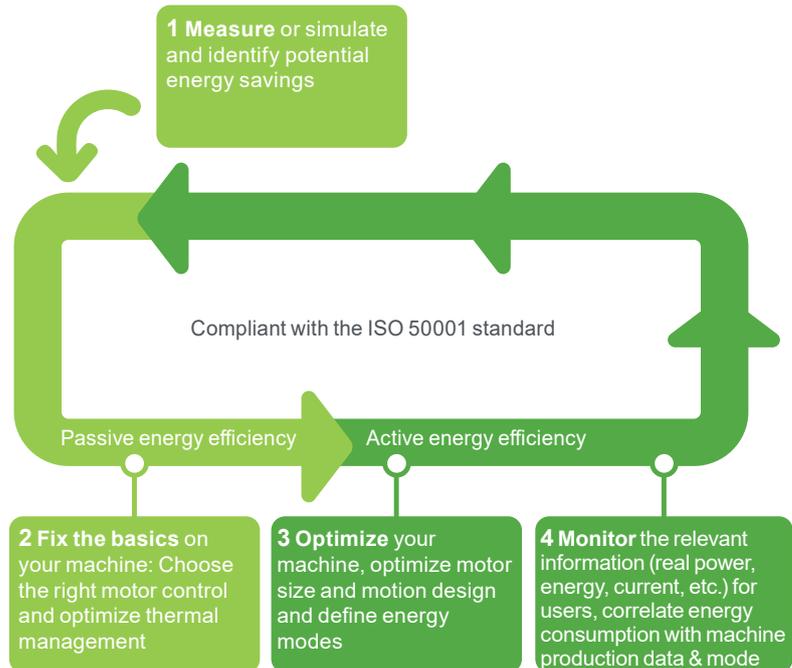


Lexium 62 multi-axis drive systems require no additional installation for a daisy chain bus coupling

Grow your business with energy-efficient solutions

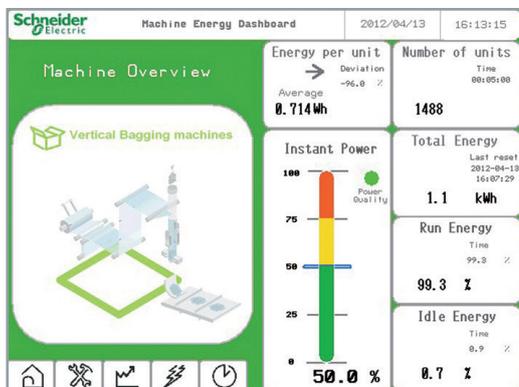
Energy efficiency is an increasing concern for your customers' global strategic planning. By offering them machines that save energy, you can stand out in the market and gain a competitive advantage. Follow the four principles of energy efficiency adapted to your machine's lifecycle, and help your customers comply with the ISO 50001 standard.

Energy optimization in four sustainability steps



How can PacDrive help you?

- > **Simulate** your individual program in virtual mode and **calculate** your machine's **energy footprint**
Measure real energy consumption
 Request Schneider Electric **consulting/engineering** for comprehensive support
- > Use Lexium SH3 series **high efficiency servo motors**
Share DC-bus using Lexium 62 multi-axis solution / Lexium 62 ILM integrated servo drives
Save energy used to cool the cabinet by shifting servo drives to the machine frame with Lexium 62 ILM series integrated servo drives
- > Use EcoStruxure Machine Expert tools for **energy efficient motion design/robotic path design**
 Use sophisticated library functions for **optimized consumption of synchronous servo axes**
 Use PackML-compliant operating modes of the PacDrive programming concept and **create standardized energy modes** for machines/lines
- > Create your individual **energy dashboard** with library functions, **monitor and calculate** energy-related figures in **real time**



An energy dashboard integrated into the machine's HMI design provides the user with constant, up-to-date information on all energy-relevant parameters

Service and support



 Design



 Build



 Operate



 Improve

Service and support that are behind you all the way

Stage in the product life cycle: "Design"

We find the best solution for your needs

- > Based on your needs, our Solution Application Experts and Application Design Experts (SAE/ADE) work out innovative technical solutions including
 - > Co-engineering
 - > Tests
 - > Validation

We understand your challenges

- > Consulting
- > Audits

We execute the solution with a full service agreement

- > Our solution design and delivery centers (Flex-Centres) are committed to quality and results and provide tests, validation, and commissioning

We improve your team's competencies

- > In class training and On site training

Stage in the product life cycle: "Build"

We ensure the delivery of your solution

- > Availability of components through a large worldwide network of distributors
- > Collaboration, management, and delivery through local partners
- > With Schneider Electric as your turnkey solution partner, your solutions will include:
 - > Project management and responsibility
 - > Engineered systems
 - > Third-party components management
 - > Customizations and adaptations

We provide on-site services and support

- > Secondment of qualified personnel to deliver on-site engineering and technical services

We improve your service team's competencies

- > Service and commissioning training
- > Supply chain optimization

Stage in the product life cycle: "Operate"

We provide international sales and after-sales services for you and your customers

- > Maintenance contracts
- > Spares parts and repairs
- > Just-in-time delivery
- > Return of goods
- > Service expertise:
 - > Error diagnosis and repair
 - > Environmental measurements (EMC, fieldbus, thermography, power quality analyses, etc.)
- > Customer International Support (CIS) as a single point of contact:
 - > A network of dedicated local country experts
 - > Web-based collaborative platform for efficient communication

We improve your customers' competencies

- > In-class customer training and On-site training
- > Customer service and commissioning training

Stage in the product life cycle: "Improve"

We improve your machine ranges

- > Consulting

We improve your customer's machines in their production line

- > Audits
- > Training
- > Migration and upgrade
- > Services Expertises:
 - > Consultancy
 - > Retrofitting

Life Is On



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