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Meet your challenges with MachineStruxure™

Schneider Electric is one of the world’s leading machine automation solution providers, and with MachineStruxure we have designed a total solution consisting of technology, engineering support, and a wide range of services that help machine builders meet their challenges.

Reduce time-to-market
- Building new machines quickly is the key to success. Engineering concepts should be easy to learn and require a minimum of training in order to reduce programming and configuration time. Ready-to-use-architectures, programming templates, and off-the-shelf software are the pillars of our high quality solutions.

Increase profitability
- Machines don’t just have to be innovative, they must also be cost-effective to build. To increase profitability you need products and solutions with all essential functionalities embedded so that there are no costly interfaces to add and no time-consuming extra functions to integrate.

Improve efficiency
- Efficiency has become a key concept loaded with implications for energy efficiency, cost-efficient automation solutions, and efficient engineering. With performance that is the benchmark in the industry, you can improve your efficiency with complete automation solutions based on compatible software, controller, motion and safety technologies. Specific energy-efficiency functions are also available for measuring and monitoring electrical consumption.

Simplify integration and maintenance
- Today, machines are integrated in production lines as well as in vertical information flow. Communication with machines and access to diagnostic data through the Internet and mobile devices has become standard. Spare parts must be fast and easy to replace for increased machine availability. Standardized interfaces and web protocols simplify the implementation of information flow.
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As a global specialist in energy management, Schneider Electric offers integrated solutions across multiple market segments, including leadership positions in Utilities & Infrastructures, Industry & Machine automation, Data Centers & Networks, and in Residential. Focused on making energy safe, reliable, efficient, productive and green, Schneider Electric delivers complete solutions for manufacturing and process industries.

A fully embedded portfolio of solutions: PlantStruxure and MachineStruxure allow the scalable automation of processing systems, individual production machines, and entire production lines; EcoStruxure is an approach to creating an intelligent energy management system within your facility/ factory.
A single, fully embedded solution

> Within MachineStruxure, Schneider Electric has included both hardware and software products as well as the full scope of its industry know-how and services covering a wide range of applications, including: packaging, hoisting, HVAC & R, pumping, material working, and material handling.

> The guiding principle behind MachineStruxure is the flexible and scalable automation of machines, using functionally adaptable control technology embedded in a standardized, platform-neutral environment of software and components. And SoMachine is the single software environment that puts it all together, regardless of whether the machine is driven through logic, HMI, drive, motion, or safety controllers, and at any level of performance.

> A broad portfolio of components for drives, HMI, I/O, and fieldbus interfaces, as well as a variety of electrical components, provide the framework for complete system solutions with MachineStruxure. Machine builders can use the same peripherals for designs ranging from simple machines to robot-assisted, high-performance demanding systems. Additional services constitute the framework for a partnership around the entire machines lifecycle.

The Next generation of MachineStruxure will help you design machines and systems for today and tomorrow that can reduce time to market, improve design efficiency and simplify the integration and maintenance of your machines whilst increasing your profitability.
**General presentation**

Technology and services for automating the entire machine

The Next generation of MachineStruxure will help you design machines and systems for today and tomorrow that can reduce time to market, improve design efficiency and simplify the integration and maintenance of your machines whilst increasing your profitability.

### Flexible & scalable machine control

**Automation hardware with flexible & scalable performance**

> Flexible & Scalable Machine Control is the technological core of MachineStruxure. The drive, HMI, logic, and motion controllers are suitable for a wide range of machines. They also provide specific functions for Packaging and Material Handling – with and without robotics - as well as Material Working, Hoisting, HVAC & R and Pumping applications. With safety controllers for hardwired and embedded safety network solutions, requirements according to common safety standards can be met.

> SoMachine includes all tools for the entire life cycle of machinery automated with MachineStruxure addressing every aspect of project processes: standard and safe programming, drivetrain design, HMI, commissioning, diagnostics, and data handling. Whatever you need, SoMachine is one of the most modern and powerful tool concepts on the market.

### Architectures & engineering intelligence

**Solution concepts for efficient engineering**

> A wide range of machine concepts can be mapped using ready to use architectures - the TVDAs (Tested, Validated and Documented Architectures). TVDAs include system user guides, CAD files, and references to available software Application Function Blocks (AFBs) to show users how they can specifically benefit from Schneider Electric’s comprehensive application know-how.

> The modular engineering approach in mechanics, electronics and software is our way to reduce design complexity. SoMachine provides a competitive edge by reducing this complexity through standardized, modular programming in globally accepted languages with templates, and proven, documented off-the-shelf application libraries. MachineStruxure has also set new standards for graphical programming and automatic code generation in the background.
3. Customization & services

Partnership throughout the entire machine lifecycle

- Providing expertise throughout the machine lifecycle, Schneider Electric can help you grow your business and make it more profitable. We help you design your machine, speed up engineering processes, and provide you with on-site assistance.

- In close collaboration, we can help you manage entire software engineering processes. Standard, completely pre-assembled, pre-wired, and ready-for-connection cabinets speed up the assembly process. Or, if you have special requirements, discuss customization with our Solution Service. Global standard support, 24/7 hotline services, and replacement parts centers around the world enable you to achieve greater customer satisfaction.

- With employees in more than 100 countries, Schneider Electric serves its international customers throughout the world and meets the needs of its individual markets.

Reduce your time to market with intuitive automation

- Tools for intuitive programming and simulation accelerate the engineering process while easy navigation and greater transparency saves you time. But intuitive automation is more: Adapting the user interface to individual user habits reduces the training required when using MachineStruxure for the first time. When working with transparent and well-arranged ready-to-use-architectures or template structures, the goal always stays clearly in sight. Make it as simple as possible, focus yourself with full attention on the task and not on the tools. MachineStruxure paves the way!

All the embedded features and functions you need to design and build machines more profitably

- No additional interfaces, no additional effort for integration: Ethernet, communications ports, SD card and much much more is now embedded, even in simple controllers for hardwired solutions. A wide range of expansion modules or ready-to-use-solutions for energy monitoring and management allows you to create your solution with minimal effort. Thanks to open fieldbus standards and an integrated PTO interface, drive solutions can be easily implemented creating an optimal solution that saves you time and money.

Improve efficiency with flexible and scalable performance

- Optimized, cost-effective automation: every HMI, drive, logic and motion controller delivers flexible and scalable performance. Easy upgrade to higher performance platforms through reuse of software is key to flexibility. Scalable safety performance according to IEC 61508 and EN/ISO13849 is available for hardwired architectures as well as for high-performance solutions with embedded safety networks. A wide range of drives allows you to create smart positioning systems with PTO up to multi-axes solutions with 99 fully-synchronized servo axes.

Simplify integration and maintenance - be connected everywhere!

- Ethernet, wireless access, web servers: with MachineStruxure you are connected everywhere! Vertical availability of production and status information becomes standard, even for simple applications. The same holds true for remote control and diagnostics. Therefore, Ethernet TCP/IP and IP are now standard even on the smallest controllers. Wireless access through mobile devices and web protocols like HTTP or FTP pave the way for access to your machine from anywhere, at any time.
General presentation
The new future-proof controller range
Intuitive programming with SoMachine

The new range of Modicon™ controllers extends the hardware core of MachineStruxure. The Modicon M221 controller for hardwired solutions, the Modicon M241 for performance-demanding applications, and the Modicon M251 for distributed architectures provide the basis for scalable logic control performance. Ethernet, mini USB for programming, web server – they’re all included and provide a high standard of connectivity without the need for additional options. The Modicon M221 and Modicon M241 have built-in I/O and PTO on the drive side. Modicon TM3 I/O systems can be added to all controllers through an embedded, extremely fast expansion bus.

> The Modicon M221 offers tremendous versatility. Available also in book format, the controller is designed for compact solutions and requires minimal installation effort. Connect a simple remote operator panel for instant maintenance and machine visualization.

> The Modicon M241 features CANopen communication and delivers a truly outstanding level of performance in its class. Multiple communication modules connected via the new Modicon TM4 communication bus can further extend connectivity, for example Profibus slave.

> With its integrated switch, the Modicon M251 controller can communicate via two Ethernet lines as well as use all options for the controller range such as flexible I/O configurations. This allows you to build modular and distributed machine configurations.

Whether it is for initial installation or service, data and firmware handling is extremely easy on all controllers.

> Standard embedded SD card slot simplifies program transfers and machine duplication.
> Program download to unpowered controllers, even those still in their boxes, is achieved through the USB port.
> QR codes printed on the devices simplify product identification, whether they are in the storage rack or installed in the field.

SoMachine is the universal programming software for machines automated by MachineStruxure controllers. Simple navigation that requires only a few clicks delivers a more efficient engineering process.

But who says that these programs all have to be engineered using the same program editor regardless of their complexity?

Therefore, we offer SoMachine Basic, a simplified engineering tool for the new Modicon M221. All programming, visualization, and commissioning are handled in just one intuitive tool that is available as a free download. No training required!
With the Next generation of MachineStruxure, machine safety has taken a giant step forward. The embedded safety feature is completely new and unique in its class of controllers. It is modular and based on the Modicon TM3 expansion bus that replaces previous requirements for compact safety relays or safety controllers. Safety modules can be docked on the controller in mixed configurations with Modicon TM3 standard modules. Each module is integrated in the communication system through the expansion bus. Alternatively, you can use remote installations in the form of safety islands that you connect to the Modicon TM3 of the controller through safety buses and communication modules.

The modularity of the new safety offer features optimum scalability of safe logic functionality allowing you to choose the precise amount of I/O needed for the application, whilst noticeably decreasing installation time. Function modules, such as the safety speed control unit with embedded advanced drive control and modules for different types of presses, provide fast, standards-compliant implementation of security functions. Program data for the modular safety controller is stored on SD cards to add the benefit of open data transfers.

For motion controller-based applications with PacDrives, embedded safety has long been standard. Secure and standard communication run in parallel across the sercos automation bus. In addition to existing functions, new advanced functions like Safe Torque Off (STO) and Safe Stop 1 (SS1) are now available for implementation, such as Safe Stop 2 (SS2), Safe Operating Stop (SOS), Safe Limited Speed (SLS), and monitoring Safe Direction (SDI).

Complex servo applications with multiple axes or even integrated robots require software strategies to reduce complexity. Originally developed for packaging machines, the IEC 61131-compliant programming template has proven its qualities in other areas as well, including material working machines. Nevertheless, the template-based programming concept of Schneider Electric represents concentrated know-how in packaging technology.

With implemented OMAC-compliant operation modes, libraries with application function blocks for typical applications in the Food & Beverage industry and a Robotics Library for all current kinematics, the user receives long-standing, application know-how obtained at the highest level.

Tested, Validated, Documented Architectures (TVDAs) - provide a foundation for the design of machines in many different applications. Each generic TVDAs can be adapted to a broad range of machines.

With hardware lists (BOM) and CAD files, they provide added value all the way from machine design and engineering on through to installation and documentation.

A system user guide refers to all needed steps for setup and commissioning of the automation system. In addition provides detailed support on required system adaptations.

With hardware lists and CAD files such TVDAs are bridging from design/engineering to installation and documentation. A listing refers to all needed library software function blocks for realizing the machine functions.
General presentation
Optimized automation architecture

Optimized automation architectures...

... for compact and small to medium size control applications
Compact / Hardwired / logic controller Modicon M221

Solution breakdown
1. Circuit breaker Compact NSX
2. Energy meter IEM32
3. Switch mode power supply Phaseo
4. Logic controller Modicon M221
5. Emergency stop Harmony XALK
6. Graphic display TMH2G2B
7. Safety module Modicon TM3
8. Switch disconnector fuse TeSys
9. Magnetic circuit breaker TeSys GV2L
10. Variable speed drive Altivar 12
11. Variable speed drive Altivar 312
12. Servo Drive Lexium 28
13. Control & Signalling units Harmony
14. Proximity & photoelectric sensors, limit switch, encoder OsiSense
15. Wireless Ethernet access ConneXium

for machines demanding control systems with optimized space requirements
Compact / CANopen / HMI Controller SCU

Solution breakdown
1. Circuit breaker Compact NSX
2. Energy meter IEM32
3. Switch mode power supply Phaseo
4. Distributed IO expansion Modicon OTB, IO modules Modicon TM2
5. HMI controller Magelis SCU
6. Emergency stop Harmony XALK
7. Safety module Preventa XPS
8. Switch disconnector fuse TeSys
9. Magnetic circuit breaker TeSys GV2L
10. Variable speed drive Altivar 32
11. Servo Drive Lexium 28
12. Control & Signalling units Harmony
13. Biometrical switch Harmony
14. Safety switch Preventa
15. Proximity & photoelectric sensors, limit switch, encoder OsiSense
16. Wireless Ethernet access ConneXium
General presentation
Optimized automation architecture

Optimized automation architectures...

- Motion optimized solution
- 30% less costly compared to conventional PLC systems

... for drive centric applications requiring flexibility
Compact / CANopen / Drive Controller ATV IMC

Solution breakdown
- Circuit breaker Compact NSX
- Contactor TeSys D
- Circuit breaker TeSys GV2L
- Switch mode power supply Phaseo
- Drive controller Altivar IMC
- HMI Magelis STU
- Safety module Preventa XPS
- Magnetic circuit breaker TeSys GV2L
- Variable speed drive Altivar 71
- Variable speed drive Altivar 312
- Servo Drive Lexium 28
- Proximity & photoelectric sensors, limit switch, encoder OsiSense
- Control & Signalling units Harmony

... for medium to large applications requiring a scalable “all embedded” PLC design
Compact / CANopen / Logic Controller Modicon M241

Solution breakdown
- Circuit breaker Compact NSX
- Energy meter IEM32
- Switch mode power supply Phaseo
- Logic controller Modicon M241
- Ethernet switch module Modicon TM4
- Safety module Modicon TM3
- IO expansion module Modicon TM3
- Emergency stop Harmony XALK
- HMI Magelis STU
- Magnetic circuit breaker TeSys GV2L
- Variable speed drive Altivar 71
- Variable speed drive Altivar 312
- Servo Drive Lexium 28
- Proximity & photoelectric sensors, limit switch, encoder OsiSense
- Control & Signalling units Harmony
- Wireless-batteryless pushbutton & configurable access point Harmony
- Safety switch Preventa
- Variable speed drive Altivar 32
- Variable speed drive Altivar 71
- Servo Drive Lexium 28
- Proximity & photoelectric sensors, limit switch, encoder OsiSense
- Control & Signalling units Harmony
- Wireless Ethernet access ConneXium
Optimized automation architectures...

... for distributed automation systems requiring openness and flexibility

Distributed / Modbus TCP / Logic Controller Modicon M251

Solution breakdown
1. Circuit breaker Compact NSX
2. Energy meter IEM32
3. Switch mode power supply Phaseo
4. Logic controller Modicon M251
5. Safety module Modicon TM3
6. IO expansion module Modicon TM3
7. Ethernet hub ConneXium
8. HMI Magelis HMIGTO
9. Wireless-batteryless pushbutton & configurable access point Harmony
10. Switch disconnector fuse TeSys
11. Magnetic circuit breaker TeSys GV2L
12. Variable speed drive Altivar 32
13. Servo Drive Lexium 28
14. Proximity & photoelectric sensors, limit switch, encoder OsiSense
15. Control & Signalling units Harmony
16. Emergency stop Harmony XALK
17. Wireless Ethernet access ConneXium

Highly flexible and powerful Ethernet solution for centralized and de-centralized control

Remote cabinet
Option TVDA M221 book
Performance automation architecture...

... for medium to large applications requiring performance and high precision motion

Compact / Sercos / Motion Controller LMC078

Solution breakdown
1 Circuit breaker Compact NSX
2 Energy meter IEM32
3 Switch mode power supply Phaseo
4 Motion controller Modicon LMC078
5 Switch disconnector fuse TeSys
6 Magnetic circuit breaker TeSys GV2L
7 Servo Drives Lexium 32i
8 Variable speed drives Altivar 32
9 sercos interface module Modicon TM5
10 Safety module Preventa XPS
11 HMI Magelis HMIGTO
12 Proximity & photoelectric sensors, limit switch, encoder Osisense
13 Biometric push button, Control & Signalling units Harmony
14 Safety switch Preventa
15 Emergency stop Harmony XALK
16 Switch Ethernet ConneXium
17 Wireless Ethernet access ConneXium
In packaging automation, Schneider Electric is one of the leading companies 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.

More than 100,000 machines worldwide are automated today with the prestigious Modicon controllers and PacDrive platforms. Everything is possible, from simple positioning applications up to 99 synchronous driven servo axes or integrated robots.

To save time and enhance quality, standard machine concepts can be automated with TVDAs and matching library software modules. For complex applications, the template-based software strategy was developed with advanced software function blocks. This supports the trend to modular machines with standardized, reusable machine programs due to the trend in packaging automation.

Motion control-based automation architecture for 2 to 99 synchronized servo axes and/or robotics, safety-related and standard communication run on a common automation bus. If only coordinated axes are sufficient, alternatively for many machine concepts, Logic and drive-controller-based architectures are available.

More information in our “Motion centric machine automation with PacDrive 3” catalogue
Thanks to the wide range of controller hardware included in the MachineStruxure solution, Schneider Electric has extensive experience with material working machines. Applications range from simple bending machines or presses to multi-axis material working machines. Even NC applications such as laser-welding machines or cutting plotters with up to three interpolated axes can be realized with standard Modicon motion controllers from MachineStruxure.

TVDAs significantly shorten the process from design to documentation for many types of basic applications. In addition to TVDAs, our material working library, with function blocks such as “Flying shear” or “Rotary knife” for motion control, further reduce programming effort and time to market. Complex applications like material working or assembly can be mapped using template-based, modular software structures for maximum efficiency. Lexium servo drives are suitable also for many torque and linear motors available on the market and increase the flexibility for machine design.
General presentation
Standardized architectures for all hoists and cranes

Whether you design industrial or construction cranes, Schneider Electric has proven solutions to enhance their productivity. And for all types TVDAs compliant to EN ISO 13849-1 and technology-specific function blocks, such as “Overload control EN 15011” or “Load over speed control” are available to reduce the time to market of your cranes while increasing their safety.

Enhanced support is delivered by our global team of experts with their unparalleled knowhow in automation and industrial machine standards. Our hoisting architectures can even help you to improve energy efficiency in your cranes while simplifying their maintenance thanks to their regenerative systems and data storage monitoring capabilities. With complete automation solutions – some even dedicated to the characteristics of local markets – and industry-specific know-how concentrated in MachineStruxure, Schneider Electric has many satisfied crane manufacturers around the world.

A complete ready-to-use-architecture for self-erecting cranes; related/available software functions: Data storage monitoring, wind speed control, smooth slewing, and safety solutions.
In material handling, Schneider Electric has taken its solutions far beyond basic technologies. Logic, motion, and especially drive controllers, which are perfect for simple conveying requirements, form the hardware foundation of a wide range of tasks such as feeding, separation, or infeed. TVDAs and library functions simplify implantation of individual solutions. For demanding applications, elements like modular linear motion systems and Delta2 and Delta3 picker solutions are of particular interest. Portals based on linear motion can form the basis for material handling solutions, such as buffer for small load carriers or sorting systems for beverage. The picker provides maximum flexibility when operating with fast product flows. Right up to stainless steel robots in hygienic designs, Schneider Electric can offer complete solutions: hardware, software and mechatronics – and, of course services.

TVDA for automation solution with only a few synchronized axes, for example for linear motion portal robots.
There are few areas where energy efficiency plays a greater role than in HVAC & R: heating, ventilation, and air conditioning can account for over 40% of energy consumption in many buildings and facilities. From variable speed drives to power monitoring and dedicated application function blocks, MachineStruxure provides smart strategies to improve energy efficiency in small and medium air-cooled chillers, air handling units, and in solutions for large buildings or facilities.

Fieldbus interfaces like BACnet, Modbus or LonWorks and other typical communication standards for building automation solutions pave the way for integration in BMS architectures. SCADA and HMI applications enable maintenance personnel to monitor and control installations from anywhere, using just a smart phone or a tablet. With OptiM2M, a web-based machine-to-machine monitoring application, incoming machine data can be viewed remotely and analyzed at any time, from anywhere in the world.

TVDA for small and medium air-cooled chillers and air-handling units. The controller, dedicated in particular for such applications, is available as a programmable logic controller with application function blocks or as a parametric logic controller with pre-loaded application programs.
Water & Wastewater, commercial buildings, industry or irrigation: Schneider Electric is your one-stop-shopping partner for complete pumping solutions. Schneider Electric offers automation solutions based on flexible controller hardware and single software environments.

For pumping solutions, energy efficiency plays an important part. Much more important to machine builders, however, is their degree of freedom to differentiate themselves from competition through individual solutions. TVDAs and a new software library lay the foundation for a broad range of pumping solutions. In particular, state-of-the-art software libraries allow you to create energy efficient, individual pumping applications with clear unique selling propositions, and to get to market faster. In addition, an outstanding level of technical support is included in our MachineStruxure solutions.

Booster multidrive architecture for typical booster solutions for fresh water supply of large buildings, e.g. hotels, office buildings, shopping malls, service areas, resorts, etc.