

Rexroth IndraMotion MLC

The innovative Motion Logic system

Simple, open and flexible



Rexroth IndraMotion MLC – Simple, open and flexible

Rexroth's IndraMotion MLC lets you take advantage of the freedom offered by today's machine automation technology. This complete system solution integrates all control elements in an innovative architecture. It is based on worldwide software standards and allows you to use motion control, PLC logic and technology functions to develop simple, open and flexible automation designs.

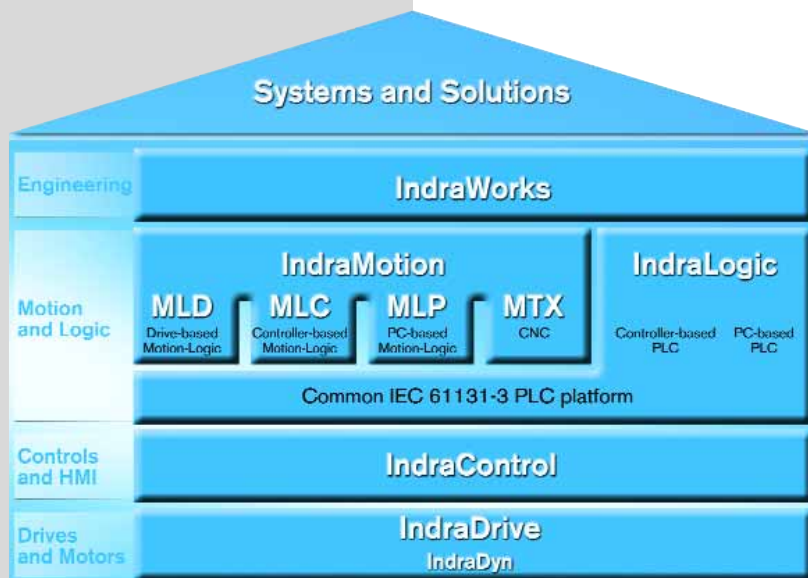
Higher productivity, maximum flexibility and improved efficiency – users expect more and more from today's production machines. This trend is reflected in the wish list for current automation systems:

- easy to use
- open engineering software tool-kit based on worldwide standards
- automation flexibility

Rexroth is a global producer of innovative automation systems. We have an unparalleled level of expertise in the development of high-performance motion control systems, and our process knowledge base covers thousands of applications.

Our IndraMotion MLC bundles this know-how into a new system solution designed for maximum efficiency. You use integrated control architecture to implement all of your solutions without restrictions:

- innovative motion control
- standardized PLC logic
- scalable technology functions
- standardized engineering



IndraMotion MLC, part of Rexroth's Automation House, is an integrated solution which combines motion control, PLC and technology functions. It gives you all of the system components you need to implement your automation designs. It includes everything from the drives and controllers to a powerful framework which offers a standardized, user-friendly environment for all of your engineering work. This innovation is the result of our many years of applications experience and it offers you the freedom of automation technology – logical, intelligent and an investment for the future.

Simple

- automation based on the fusion of motion control and PLC logic in a fully-featured system
- engineering using the IndraWorks software toolkit
- implementation with ready-to-use technology functions
- handling through the uncompromising use of open industry standards

Open

- logic programming thanks to complete IEC 61131-3 compatibility
- motion control based on the best possible integration of PLCopen standards
- integration through support of standardized communication interfaces
- for future technologies with software modules that are designed to work together

Flexible

- applications through optimal adaptation to a variety of processes
- architecture using open hardware and software interfaces
- complete solutions using scalable system components
- functionality for all of your synchronized, high-precision machines and systems



Simple to use

Reduce complexity and cut the time it takes to develop your automation solutions. IndraMotion MLC merges motion control, PLC logic and technology functions to create an integrated control architecture. IndraMotion MLC system software makes consistent use of open industry standards to protect your investment in the long term and reduce your engineering costs. Used in conjunction with our compact IndraControl L control hardware, it gives you all of the automation functionality you need in one complete, transparent system.

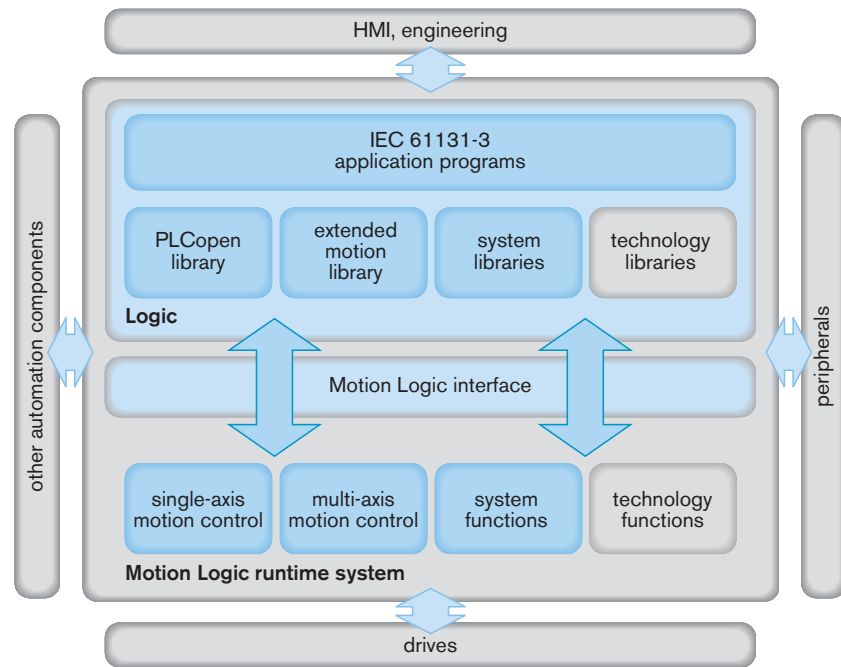
The innovative IndraMotion MLC runtime system offers IEC 61131-3 compliant system functions which can be called from application programs. A powerful motion kernel ensures real-time processing of hard synchronized motion control functions for all single and multiple processes. A transparent Motion Logic interface provides simple connectivity to the integrated PLC logic, guaranteeing maximum data consistency and flexibility on all cyclic and acyclic access to the motion control functions.

Your benefits

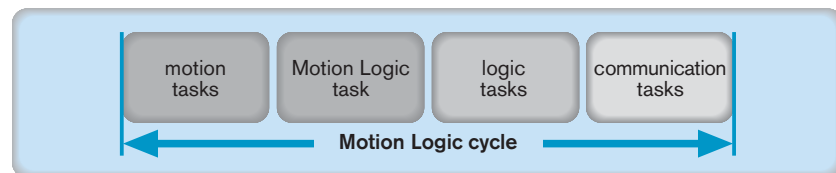
- integrated system architecture including motion control, PLC and technology modules delivers maximum performance
- motion kernel and SERCOS interface provide excellent synchronization of drive functions
- modular function libraries for faster implementation and reduced complexity
- standardized hardware and software interfaces increase productivity and reduce automation costs
- system components designed to work together in a complete modular system protect your investment



Function libraries make it easier to use the drive and control functions, and they are easy to integrate. In addition to standard PLCopen-compliant modules, you can use enhanced motion control and technology functions for a variety of different machine processes. The runtime system simultaneously performs cyclic processing of all parameterized channels to the control peripherals. This makes it easy to integrate programs and interfaces for dynamic motion sequences. Our scalable, modular system of fully-compatible components offers unparalleled plug-and-play functionality, from the HMI right down to the drive. As a result, your machines and systems deliver more flexibility and productivity.



IndraMotion MLC offers transparent data interfaces and function libraries using an innovative architecture, which provide access to powerful Motion Logic functions



The high-performance runtime system handles all of the motion control, PLC logic and communication tasks as well as the SERCOS synchronous Motion Logic task while maintaining data consistency

Open engineering

With IndraMotion MLC and the IndraWorks engineering software toolkit, you can finally carry out all of your engineering work in a standardized software environment. IndraWorks is based on the latest Microsoft .NET technology. It combines a full-featured user interface and centralized data storage with all of the configuration, parameterization, programming, diagnostic and visualization tools that you need. A user-friendly interface enables you to perform project management along with system and peripheral configuration with only a few mouse clicks. Wizards help you set parameters for drive and virtual master axes.

An integrated cam editor helps you generate graphs for non-linear sequences. Programming for multi-tasking flow logic complies with IEC 61131-3. The library explorer gives you a flexible, transparent method of including motion control, technology and system function program modules in your machine programs. Underlying communications middleware provides pushbutton access to process and diagnostic data from the controller and the peripherals. The FDT/DTM plug-in design gives you an easy way to add your own enhancements in the future.

Your benefits

- component-based software toolkit for all of your engineering tasks
- transparent access to all system components
- intelligent, intuitive user interface at the HMI, controller and drive levels
- standardized IEC 61131-3 logic programming using the fully-featured IndraLogic PLC platform
- PLCopen compliant function modules and enhanced function libraries for all motion applications
- standardized communications and data storage interfaces
- integrated FDT/DTM interface provides open access to the system



The image displays a collage of screenshots from the IndraWorks software interface, illustrating its capabilities in PLC programming and HMI design. The screenshots include:

- Project tree views showing hierarchical structures of PLC programs and HMI screens.
- Ladder logic diagrams for PLC control.
- HMI screens with various controls, including buttons, sliders, and status indicators. One screen shows a control panel for a 'Produkt Rezepturmanagementsystem' with buttons for 'Temperaturregelung', 'Leistung', 'Defüllte Bewe', 'Funktionschalter', and 'Wartung'. Another screen shows a control panel for 'Einzelbeutel' with buttons for 'Leer', 'Start', and 'leerfüllt'.
- Data tables and lists, such as one showing 'Produkt' and 'Rezepturmanagementsystem' with columns for 'Produkt', 'Rezepturmanagementsystem', and 'Status'.
- Graphical plots showing data trends over time.
- Parameter configuration windows for various components.

At the bottom left, there are logos for **PLCopen**, **motion control**, and **Microsoft CERTIFIED Partner**. In the center, there are two CD-ROMs. At the bottom right, there is a screenshot of a data table with columns for 'Produkt', 'Rezepturmanagementsystem', and 'Status'.

Rexroth is a certified Microsoft partner and a member of the Microsoft Developers Network. Rexroth is a permanent member of the PLCopen organization and plays an active role in various committees.

IndraWorks integrates all of the tools you need for all of your engineering work in one full-featured, innovative software toolkit

Automation flexibility

IndraMotion MLC gives you unparalleled flexibility to integrate a wide range of machines, systems and processes. Built-in support of worldwide hardware and software interface standards enables you to quickly incorporate this integrated Motion Logic solution into your control system architecture.

Open communications based on Ethernet, PROFIBUS, DeviceNet and SERCOS interface give you all of the freedom you need to link HMI devices, peripherals and drives into a network. This reduces the amount of effort and the cost involved with integration, testing, diagnostics and maintenance of your overall automation project.

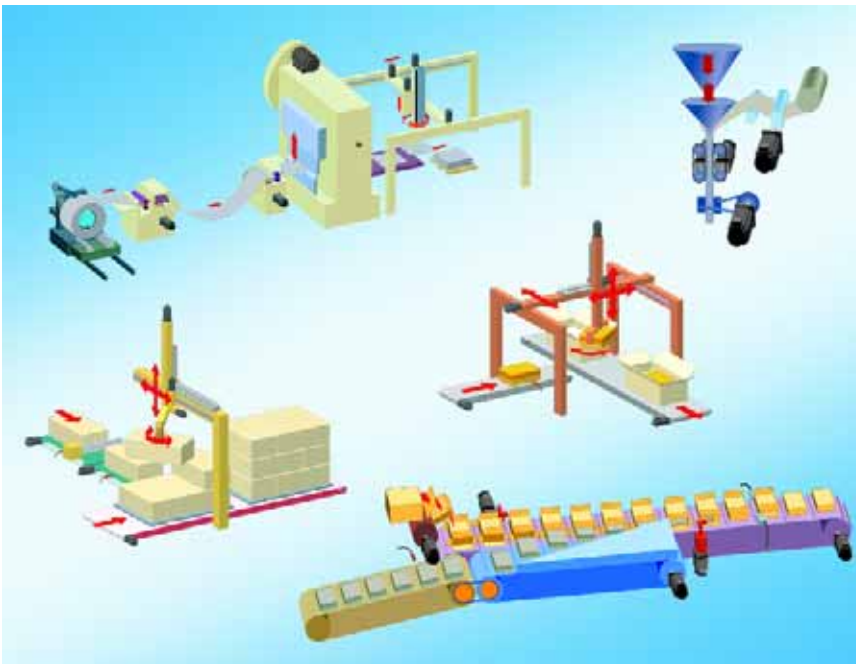
Flexible expansion of large systems and machines with more than one controller using Ethernet and the cross-communication interface protects your investment and helps make your solution future proof. Comprehensive software libraries containing ready-to-use technology functions simplify implementation and make it easy to modify machine processes to meet your requirements.

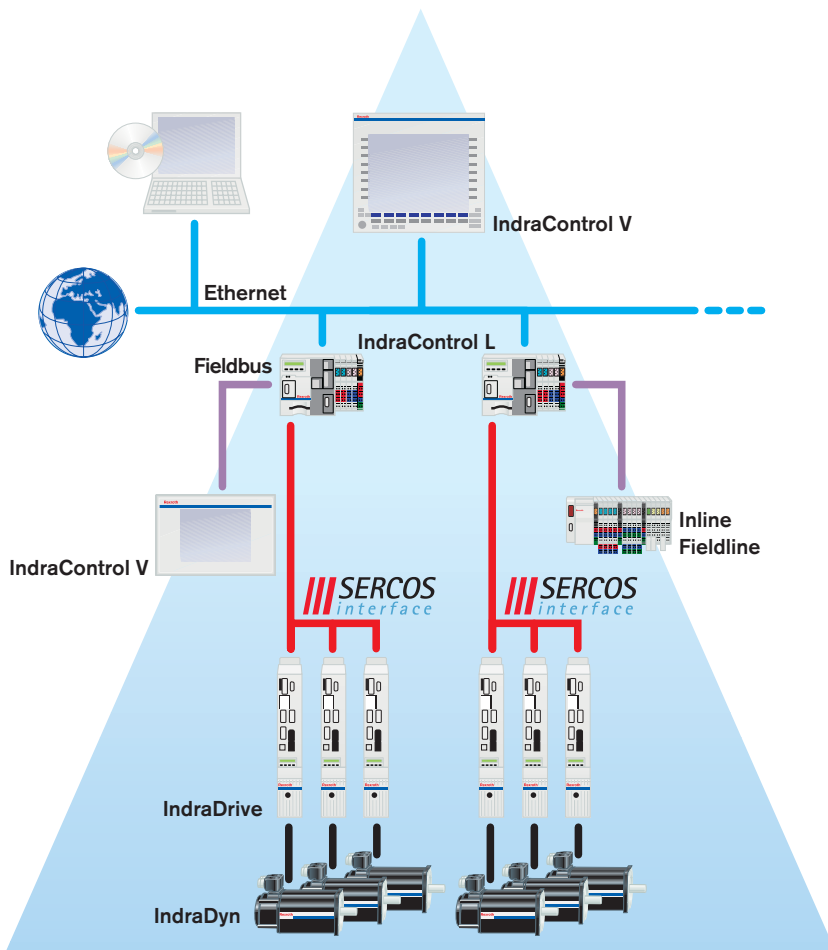
Open system architecture and the ability to add additional functions make the IndraMotion MLC the ideal choice for applications such as:

- food and packaging
- printing and processing
- forming
- handling

Your benefits

- fast integration into a wide variety of processes, machines and systems
- simple networking with one or more controllers using Ethernet and the cross-communication interface
- ready-to-use technology modules for demanding applications
- function modules to enhance communication and technology capabilities
- standardized system architecture with scalable control components
- transparent automation designs using modules which are designed to work together





The modular IndraMotion MLC system architecture and the use of standardized interfaces give you maximum freedom and flexibility in a wide variety of applications

Control system, HMI, engineering

Ethernet-based communication between controllers, HMI and higher-level systems using TCP/UDP/IP and Ethernet/IP, etc.

Controllers

When it is used as the core system component, IndraControl L can be connected via Ethernet and fieldbus to other automation units. I/O units are connected centrally.

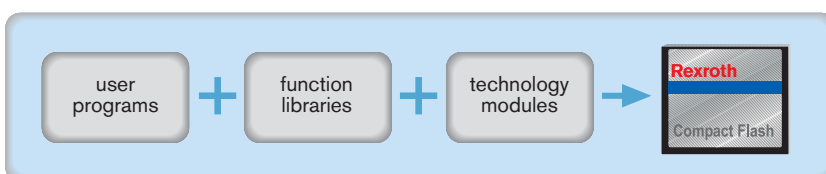
HMI and I/O

Standardized fieldbuses are used to connect peripherals such as HMIs and I/Os.

Drives

Synchronized drives on the SERCOS interface (and in the future on Ethernet-based SERCOS III) deliver maximum performance and dynamics.

The adaptable solution



When you choose IndraMotion MLC, you can put together the ideal combination of user programs, function libraries and ready-to-use technology modules to create your application-specific solutions. This makes your machine systems less complex, and it reduces your engineering costs across the board.

Building complete solutions from system modules

**IndraDrive and IndraDyn –
the scalable drive platform**



- scalable power with ratings from 1 to 120 kW
- maximum performance and precision
- safety-on-board with EN 954-1, Category 3 for safe drive lock and safe motion
- integrated drive PLC (optional)
- power recovery and direct power connection from 380 V to 480 V
- integrated mains contactor and braking resistor

**IndraControl L –
the controller-based platform**



- central module designed for DIN rail mounting
- outstanding performance in an ultra-compact controller
- 8 high-speed I/Os on board
- integrated PROFIBUS (Master/Slave), RS232 and Ethernet ports
- integrated SERCOS drive interface
- direct connection of Rexroth's Inline I/O modules
- simple expansion using communication and technology function modules

**Inline –
the flexible IP20 I/O system**



- scalable I/O system for central or distributed configurations
- digital modules with very fine granularity and 2, 3 or 4-wire configuration
- broad portfolio including analog, function, relay and voltage supply terminals
- no tools needed to install
- detailed diagnostics for all modules
- compact design
- fieldbus coupler for PROFIBUS and DeviceNet

**Fieldline –
the flexible IP67 I/O system**



- scalable I/O system for distributed configurations
- excellent reliability under harsh operating conditions
- fast installation using fieldbus cable assemblies
- M12 plug-in sensor/actuator connectors
- detailed diagnostics for all modules
- interfaces include PROFIBUS and DeviceNet

**IndraControl VCP, VEP and VEH –
user-friendly HMI units**



- cost-efficient HMI solutions for all applications
- broad portfolio of controller-based IndraControl VCP terminals – text-based displays to full-graphic color touchscreens
- embedded PC IndraControl VEP terminals with 8.4”, 12.1” or 15” touchscreens
- embedded PC IndraControl VEH handheld operating device for mobile applications
- fieldbus, RS232 and Ethernet ports
- ergonomic software tools for fast generation of screens

**IndraControl VPP and VSP –
high-performance industrial PCs**



- standard or high-end version using the latest processor technology
- broad portfolio of panel PCs, control cabinet PCs with remote display and complete PC operator terminals
- keyed and touchscreen versions with 12” or 15” displays
- wide choice of accessories including control panels, membrane keyboards and UPS
- intuitive engineering using IndraWorks and WinStudio software

Technical information

1 Drive units IndraDrive			
1.1	IndraDrive	BASIC and ADVANCED control sections	●
1.2	HNC 100 (hydraulic)		●
1.3	Command communication (synchronization)		SERCOS interface
1.4	Number of axes (ELS incl. virtual/encoder axes)		16

2 Controller IndraControl L40			
2.1 Interfaces			
2.1.1	SERCOS interface	On-board	●
2.1.2	Cross-communication interface (ELS)	Function module	●
2.1.3	PROFIBUS master	On-board	●
2.1.4	PROFIBUS slave	On-board	●
2.1.5	PROFIBUS master	Function module	□
2.1.6	DeviceNet master	Function module	●
2.1.7	DeviceNet slave	Function module	□
2.1.8	RS232	On-board	●
2.1.9	Ethernet 10/100 Mbit/s	On-board	●
2.1.10	Cam group	Function module	□
2.1.11	Leading axis transducer	Function module	□
2.2 On-board diagnostics and settings			
2.2.1	Status display (boot, SERCOS, test)	Display	●
2.2.2	Errors, warnings, messages, system reset	Display, keys	●
2.2.3	Ethernet settings (IP address)	Display, keys	●
2.2.4	Voltage monitor, watchdog		●
2.2.5	Relay output ready		●

3 I/O			
3.1	On-board	High-speed digital inputs: - Interrupt enabled, 50 µs delay	8
		High-speed digital outputs: - Can be used for high-speed cam output - 0.5 A, 500 µs delay	8
3.2	Local	Rexroth Inline (digital, analog, relay, technology)	● 64 Byte, max. 512 I/O
3.3	Distributed (fieldbus)	Rexroth Inline (IP20) PROFIBUS (on-board)	○
		DeviceNet (function module)	○
		Rexroth Fieldline (IP67) PROFIBUS (on-board)	○
		DeviceNet (function module)	○

4 HMI			
4.1	IndraControl VCP (controller-based)	PROFIBUS	○
		DeviceNet	○
4.2	IndraControl VEP (embedded PC)	Ethernet, OPC	○
4.3	IndraControl VSP, VPP (industrial PC)	Ethernet, OPC	○

5 Communication interfaces			
5.1	SERCOS interface	Real-time drive bus	●
5.2	Cross-communication interface (ELS)		●
5.3	PROFIBUS DP-V1, Master	E. g. peripherals, HMI	●
5.4	PROFIBUS DP-V1, Slave		●
5.5	DeviceNet Master (Explicit/Implicit Messaging)	E. g. peripherals, HMI	●
5.6	RS232		●
5.7	Ethernet TCP/UDP/IP EtherNet/IP TCP/IP	Controller	●
		Controller (slave)	●
		E. g. HMI, Engineering	●

6 Firmware functions			
6.1 Basic			
6.1.1	Runtime system	Integrated Motion Logic system, IndraLogic IEC 61131-3 compliant kernel	●
6.1.2	User definable tasks	Cyclical, asynchronous, (external) event driven	8
6.1.3	External event tasks	Synchronized to SERCOS cycle	1
		System specific (e. g. error handling)	1
6.1.4	Cycle time status/setting	E. g. SERCOS cycle time (2/4/8 ms)	●
6.1.5	Program organization	IEC 61131-3 compliant	●
6.1.6	PLCopen-compliant motion commands (selection)	<ul style="list-style-type: none"> • MC_MoveAbsolute • MC_MoveRelative • MC_MoveVelocity • MC_Home • MC_CamIn, MC_CamOut • MC_GearIn, MC_GearOut 	●
6.1.7	Enhanced motion commands (selection)	<ul style="list-style-type: none"> • MB_ReadListParameter • MB_WriteListParameter • MB_GearInPos • ML_PhasingSlave • MB_ClearAxisError • MB_ClearSystemError 	●
6.1.8	Electronic Line Shaft (ELS)	<ul style="list-style-type: none"> • Virtual axes (virtual master) • Transducer axes (real masters) • Real axes (servo drives) 	16
		Dynamic synchronization	●
		Leading axis cross-communication using a function module	●
6.1.9	Electronic gear units		●
6.1.10	Electronic cam	Resolution: 1024 cam points	4 per drive
6.1.11	Axis monitoring	E. g. power, transducer, limits	●
6.1.12	Error handling routines for status, warnings and errors	<ul style="list-style-type: none"> • Function modules • Parameter access diagnostic memory • Controller display 	●
6.1.13	Diagnostic memory		64 kB (max. 999 messages)

- Standard control functions
- Optional control functions
- In preparation

6.2 Technology (selection)		
6.2.1	Cam Group	●
6.2.2	Flying cut-off	●
6.2.3	Measuring wheel	●
6.2.4	Probe	●
6.2.5	Print mark control	●
6.2.6	Tension control	●
6.2.7	Loop control	●
6.2.8	Winder	●

7 Engineering (IndraWorks MLC)		
7.1 General information		
7.1.1	Software toolkit – multi-language features	●
7.1.2	Projects – multi-language features	●
7.1.3	Exporting/Importing PLC project texts	●
7.1.4	Firmware management	●
7.1.5	Online/offline switching	●
7.1.6	Automatic system monitoring	Error and message display ●
7.1.7	Real-time logic analyzer	●
7.1.8	Oscilloscope function	<ul style="list-style-type: none"> • Graphical output with zoom function • Displaying drive signals • Scaling • Working with/without trigger ●
7.2 Configuration		
7.2.1	System configurator	●
7.2.2	Device library	For controllers, visualization and peripherals ●
7.2.3	Startup wizards	●
7.2.4	Project navigator	●
7.2.5	I/O configurator	●
7.2.6	Fieldbus configurator	●
7.2.7	Project archiving	●
7.2.8	Parameter monitor	Of controllers, drives ●
7.2.9	Offline parameterization	Controller, drive ●
7.2.10	Cam editor	<ul style="list-style-type: none"> • Graphical cam generation • VDI 2143 motion rules • Vertex calculations: linear, quadratic, sine, polynomial ○

7.3 Programming			
7.3.1	Graphic editors	<ul style="list-style-type: none"> • Sequential Function Chart (SFC) • Ladder diagram (LD) • Function Block Diagram (FBD) • Continuous Function Chart (CFC) 	●
7.3.2	Text editors	<ul style="list-style-type: none"> • Statement List (STL) • Structured Text (ST) 	●
7.3.3	Data types	As defined in IEC 61131-3 incl. LREAL	●
		User defined: arrays, structures, enumeration, alias, pointer	●
7.3.4	Special editor features	<ul style="list-style-type: none"> • Syntax coloring • Multiple undo/redo • Context sensitive help • Context menus • Auto declaration 	●
7.3.5	Library management		●
7.3.6	Libraries	General	●
		System	●
		PLCopen (see sections 6.1.6, 6.1.7)	●
		Technology (see section 6.2)	●
7.3.7	Online debugging/initial startup	<ul style="list-style-type: none"> • Monitoring variable (trace) • Forcing variables and variable sets • Project debugging • Power flow (sequence control) • Exchanging function blocks online • Offline simulation of PLC variables • Parameter monitor 	●
7.3.8	Offline programming		●
7.3.9	Automatic variable declaration for configured drives		●
7.3.10	Axis data structures	<ul style="list-style-type: none"> • AXIS_REF (axis data reference) • ML_AXISDATA (direct access to axis data) 	●

- Standard control functions
- Optional control functions
- In preparation

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