**M-PLC**

**Programming Interface**

PLC programming interface according to IEC 61131-3

M-PLC is a complete development environment for programming the M1 controller in accordance with IEC 61131-3. The M-PLC puts a simple approach to the powerful IEC language at the disposal of the PLC programmer. Use of the edit and debugging functions is based on the proven development program environments of advanced programming languages.

- Easy entry into IEC 61131-3
- All languages defined in IEC standard 61131-3 are supported (instruction list, structured text, ladder diagram, function block diagram, continuous function chart, sequential function chart).
- Editor and debugging functions
- Provided libraries with pre-finished and tested functions

**Programming**

- Editors for programming in all IEC 61131-3 languages
  - IL Instruction List
  - ST Structured Text
  - LD Ladder Diagram
  - FBD Function Block Diagram
  - SFC Sequential Function Chart
  - CFC Continuous Function Chart
- Syntax highlighting for key words defined in IEC 61131-3
- Graphic project navigation bar (based on Windows Explorer)
- Support of all elementary IEC 61131-3 data types to 64 bit
- Support of fields, structures and pointers
- Graphic controller and task configuration
- CAN objects from *.dcf files in M-PLC can be applied as symbols
- PB objects from *.2bf files in M-PLC can be applied as symbols
- Library management for creation and management of libraries
- Watch manager and recipe manager (freely definable variable monitoring)
- M-PLC can be started several times (multiple projects open and online in parallel)
- Automatic project backup and creation of backup
- Project archiving on the controller
- Password protection for projects
- Offline simulation
- Online help
- Data exchange system-wide via SVI/SMI interface programming
Runtime system
- Any number of running M-PLC projects on one processor
- Every PLC project supports up to 16 separate tasks
- Each task can be configured independently of the others in terms of (priority, task call-up mode [event, timer, trigger, free running, sync], watchdog)
- Actual multitasking via operating system tasks (VxWorks)
- Communication between software modules (pre-compiled units)

Online functions
- Online change (exchange of blocks in running operation) also for multitasking projects
- Monitoring of all project variables
- Writing and forcing of variables
- Single cycle, single step and break points
- Sequence control (program lines that have been run through will be displayed)
- Recording and graphic presentation of project variables – trace

- Between different tasks of an IEC 61131 module: global variables or SMI/SVI
- Between IEC 61131 modules: GD flag range or SMI/SVI
- Between IEC 61131 modules and other modules (C/C++, Simulink): SMI/SVI
- Between any modules on different controllers: SMI
- Interface to visualization/SCADA/BDE
- Standard protocols: OPC DA, IEC 61850, IEC 61400, Modbus etc.
- Libraries for integration into separate software (for C/C++, C#.NET, Java)
- Support of battery-buffered data (RETAIN flag)
# Programming

**Manufacturer libraries**

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<th>Standard</th>
<th>Description</th>
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<td>IEC 61131-3 Standard functions</td>
<td>7 standard PID controllers</td>
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<td>Functions for direct access to hardware I/Os</td>
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**Extensions relative to CoDeSys**

- Display of the status "in error handling" (ERROR) in the interface
- Implementation of the I/O modules of the process image in the runtime system
- Optimized for performance, flexibility and combinability, shared use of an I/O module by multiple projects/SW modules possible
- Saving/loading of the entire project including sources to/from the controller
- Transparency of the global variables (flags, symbolic variables, structures) controller- and visualization-wide

**Integration in the SolutionCenter**

*(projects are SW modules)*

Generation of an executable *.m file with configuration information

- Task interval time measurement, can be queried in the project itself and in Device Manager
- Watchdog integration
- Execution possible in an application layer (memory protection)
- Install, start, stop, reset and delete of PLC projects in Device Manager
- The state machine of a PLC project in the runtime system always corresponds to the model defined for SW modules.
- Integration via M1 system debug mode and M1 system logbook
- Start of a project when booting through entry in MConfig.ini

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*System Overview • Bachmann electronic GmbH • 05/2018 • Specification subject to change – the product’s characteristics are exclusively governed by the data of the respective user manual.*