CODESYS® in Building Automation

IEC 61131-3 development software for efficient building and infrastructure automation.
CODESYS in Building Automation

CODESYS is the ideal platform for planners, system integrators and device manufacturers who want to offer functionality that goes beyond off-the-shelf or proprietary building solutions. The CODESYS Development System is the most commonly used IEC 61131-3 development and engineering environment for programmable devices in the area of building automation and building management. CODESYS compatible controllers can be found in classic building technology, for example for regulating lighting, shading or air conditioning technology, but also in higher level central management systems such as control rooms or tunnel systems.

There are good arguments for using CODESYS in building automation:

Without additional software CODESYS integrates the necessary functionality for commissioning, project optimization all the way to maintenance and operation of an implemented building installation. Along with classic application development by means of provided textual and graphical editors, the system offers countless options for the optimization of the software engineering. Application developers can access standard functions in existing user libraries or manage their own modules in libraries. With integrated product upgrades, recurring tasks can be packaged in fully configured modules that can be flexibly used and combined without additional programming effort. After commissioning a system, CODESYS offers users countless possibilities for monitoring system parameters all the way to real time protocolling.

Through the broad availability of CODESYS on the most important industrially used CPUs and operating system platforms manufacturers of building controllers can implement a development interface for their devices with little expense and effort. Manufacturers, building planners and users profit from integrated add-on functions such as support of fieldbus systems and communication standards or the integrated visualization.

A selection of CODESYS applications in building system technology:

- Temperature controllers and air conditionings
- HVAC technology
- Exhaust air units
- Parking ramp controllers
- Measurement and cleanroom technology
- Room controllers (automated lighting/heating/shading in office buildings)
- Air conditioning of computing centers and server rooms
- Air conditioning of hospitals
- Air conditioning of greenhouses
- Ventilation of tunnel systems
- Bridge controllers
- Building management system (BMS)
- Central energy management systems

Sample application configurations with CODESYS

The advantages of CODESYS at a glance

- Powerful engineering platform for the development of application software with user-oriented language elements and an extensive diagnostics functionality
- Lowering of the development risk through numerous, immediately available functions, user libraries and intelligent expansion capabilities
- Comprehensive development environment for application program, user interface, bus connection, maintenance and diagnostics
- Large number of programmers/system partners with application know how available
- Independence in the selection of device technology
- Decoupling of proprietary systems through widespread distribution of the platform and support of communication standards in building technology
What advantages does CODESYS offer in building automation?

One platform for application development, commissioning and maintenance

- Programming languages (graphical/textual) standardized according to IEC 61131-3: optimized for the development of complex applications
- Development of application software: comfortable programming/design through application specialists instead of computer scientists
- Optimum alignment to large automation projects that consist of numerous recurring modules: object-oriented programming with interfaces, classes and methods
- Formalized software development possible: with integrated add-on tools for UML and test automation as well as connection to external tools like Apache Subversion® or Matlab/Simulink
- Expandability through add-on software: CODESYS Store with access to application libraries, sample programs and templates
- Scalability of device technology: system size and functional structure of the hardware scalable in accordance with application requirements and operating site
- Assumption of centrally coordinated primary tasks (SCADA system) and abstracted IT infrastructure/networks through available cloud connections
- Faster and easier (remote) maintenance access through small local and mobile user/diagnostics interfaces and low application download times
- Decoupling of device selection and decision for software and communication technology: support of numerous device manufacturers and fieldbus systems/standard protocols

Additional functions completely integrated

- Support of the most important fieldbus systems and protocols: integrated configurator and stack for BACnet, IEC 61850, Modbus, CANopen, EtherCAT etc.
- Creation of practice-oriented and application-oriented user interfaces: graphical editor with modern visualization elements integrated in the development environment
- User interfaces for commissioning, tests and operation on various platforms: in the development environment, on remote PCs or directly on the display of the building controller
- User interfaces for remote operation/maintenance or diagnostics by webserver with HTML5: function monitoring with tablet and smartphone
- Industrial communication standards immediately available: data exchange via OPC/OPC UA without implementation and adaptation effort
- Enhanced development possibilities with integrated add-on tools: the UML class diagram for structuring large projects and the CODESYS Application Composer for efficient and flexible use of recurring functions

Best prerequisites for the automation of demanding building projects

- Proven system platform: CODESYS used throughout the world in numerous building complexes
- Large selection of CODESYS compatible devices in different classes for climate control or classic light and shading technology in the CODESYS Device Directory at www.codesys.net
- Large community of users: expert support in creation of applications through consulting engineers/system integrators
- Compatible ancillary equipment: convenient user interfaces/displays, maintenance and diagnostics tools etc.
- CODESYS Forum for exchange in community. CODESYS Store for access to existing application libraries and add-on tools

Product components especially designed for building automation applications

CODESYS Application Composer

- Development tool for the efficient creation of application software: ideal for applications consisting of recurring function modules
- Functional program units (system components or pure software functions) are combined into intelligent modules
- Automated generation of application code including visualization and device configuration through integrated generators
- Improvement of re-usability and quality of application elements

CODESYS BACnet

- Cross-platform communications protocol especially designed for building automation
- Completely integrated BACnet configurator: easy linking of BACnet objects as devices in the CODESYS Development System without additional tools
- Direct access to BACnet-properties via the device
- Easy integration of BACnet devices and applications in existing networks without additional implementation effort

CODESYS OPC/OPC UA

- Platform-independent data exchange between management and control level through standardized interfaces
- Optional components for cross-platform communication:
  - CODESYS OPC Server: for DCOM based accesses to OPC clients integrated in the CODESYS Development System with OPC server, configurator and logger for debug purposes
  - CODESYS OPC UA Server: for platform-independent and DCOM-independent controller accesses based on TCP/IP and secure communication by means of optional encryption and authentication

OPC Classic

- OPC Server
- Proprietary Protocols
- HMI, MES, ERP

OPC Unified Architecture

- OPC UA Server
- OPC UA
- HMI, MES, ERP
- PLC
- DCS
- Remote I/O

Building Automation
Information for manufacturers of building system technology

With CODESYS, hardware manufacturers can easily turn their own devices into intelligent devices for building system technology.

Technical properties of CODESYS

- Optimum support for popular CPUs / operating systems for industrial applications:
  - CPUs for programmable small devices such as Tricore, ARMx/Cortex Mx without or with proprietary operating system
  - High performance CPUs for compact high-end applications such as Intel Atom, PowerArchitecture or Cortex A8/A15 with WinCE, VxWorks or Linux
- Expandability of the CODESYS Development System through device/manufacturer-specific plug-in components

Required implementation steps

- Selection of CPU and operating system
- Implementation/adaptation of the runtime system with the help of a toolkit (SDK):
  - Tool-supported adaptation of system-specific functions of the run-time system in accordance with integration manual, numerous reference implementations available
  - Configuration/adaptation of the communication drivers to the CODESYS Development System
    - If necessary integration of specific device libraries for calling from the application software
    - If necessary integration of customized additional functionality on the basis of defined interfaces
    - Compilation of the adapted runtime system and embedding in the device
    - Qualified adaptation support in all phases from experienced project engineers
- Validation and system test, optionally with CODESYS Test Manager

Marketing of the building controller together with the CODESYS Development System, optionally with your own plug-ins

Manufacturers of building technology programmable with CODESYS:

- Beckhoff Automation
- Berghof
- Eaton Industries
- Elutions
- Exor International
- M-System
- WAGO Kontakttechnik
- Weiss Klimatechnik

Building automation

Building-specific libraries

- Efficient development of building applications using existing IEC 61131-3 application libraries
- Easy access via the CODESYS Store:
  - OSCAT BASIC and OSCAT NETWORK: manufacturer-independent open-source-libraries with access to standard functions in building automation (control engineering, network and communication functions, date and time functions etc.)
  - CODESYS Application Composer libraries: free module libraries for use within the CODESYS Development System with typical modules for classic building automation tasks (light and shading technology, weather station etc.)
  - SNMP library: retrieval of information from network devices (printers, routers etc.) by the controller via SNMP (Simple Network Management Protocol)

Operation / Maintenance / Diagnostics of building technology

- Comes supplied with proven visualization elements and controls in the application: create practical graphical user interfaces quickly and easily
- Different display platforms with one source file:
  - Directly in the CODESYS Development System – for test, optimization and commissioning
  - CODESYS TargetVisu: for operation and processing of the application software on a single device with display
  - CODESYS WebVisu: for diagnostics, remote operation, remote maintenance in the web browser of PC/tablet/smartphone
  - CODESYS HMI: for operating and monitoring on remote displays/terminals
- Wide range of services available: alarm and user management, convenient style, language and image switching, data recording, flexible communication concept, multi-touch support etc.

With CODESYS, hardware manufacturers can easily turn their own devices into intelligent devices for building system technology.
CODESYS – the manufacturer-independent IEC 61131-3 automation software.

CODESYS for further industries:

Factory Automation

Mobile Automation

Energy Automation

Embedded Automation

Process Automation

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Note: Not all CODESYS features are available in all territories. For more information on geographic restrictions, please contact support@codesys.com.