CODESYS® Visualization

Creation of professional visualization screens directly in the PLC Development System – displayed on a target device, a PC or a web browser.
CODESYS Visualization

CODESYS is an integral part of industrial automation. The IEC 61131-3 automation software has established itself firmly in the factory and process automation, the automation of mobile vehicles, power plants and buildings, among others.

The CODESYS Visualization consists of

- a visualization editor integrated into the CODESYS Development System for creating arbitrarily complex user interfaces based on available visualization elements
- different combinable display variants (see figure on p. 6/7)
  - CODESYS Visualization for testing and commissioning, integrated into the CODESYS Development System
  - CODESYS TargetVisu for control systems with integrated displays
  - CODESYS WebVisu for display in a standard browser (PCs, Tablets, Smartphones)
  - CODESYS HMI for dedicated display devices or PC-based visualization.

Because of the close and efficient connection to the controller, the CODESYS Visualization is predestined for machine-level operation.

What distinguishes the CODESYS Visualization from other systems?

- Integration into the PLC programming system:
  - A project contains controller application and visualization.
  - Management of data exchange is not necessary: Identical variables in the visualization and programming.
  - Use of the entire infrastructure of the CODESYS Development System for the visualization, e.g. library management and source code control or search and replace.

- Platform independence:
  - Executable on nearly all platforms, on which the CODESYS Runtime System is running
  - Ready-made adjustments for Windows, Windows CE, Linux
  - The same user interface for all display variants
Functions in the CODESYS Visualization

Intuitive operation by means of an integrated graphical editor
The graphical editor for creating visualization pages is completely integrated into the CODESYS Development System. The user interfaces created with it are available as objects and are part of the overall project. All global functions, such as search, replace, print, and compare, are also available in the visualization editor. It supports all IEC 61131-3 data types.

Trace/Trend
The real-time trace recording contained in the CODESYS Runtime System can be displayed as a time diagram by the visualization element Trace. The recording is controlled via a trigger event. During the trend recording, the data are written to a storage medium. Any time period from these data can be displayed in the visualization. Further processing with external tools, such as Excel, is also possible.

Recipe management
Using the recipe management, the user can write a set of variables cycle-consistently in a controller, thereby bringing the machine or system to a certain state. CODESYS supports the user in writing, reading, and managing the different recipes. Any number of recipes can be both prepared in the CODESYS Development System and created and managed during operation.
Image switching
Depending on the values coming from the controller, images can be switched dynamically. The images are managed in image lists; the dynamic access to these is managed via an ID. When an error occurs in a system, then, for example, a certain system image, depending on the error number, can be displayed.

Flexible communication concept
By means of the CODESYS component “DataServer”, the data of any number of controllers (multi-PLC) can be visualized centrally on a single display device when the CODESYS HMI is used. Likewise, it is possible to connect several visualization clients with one controller (multi-client). In this case, every connected client has its own current user interface and its own user login.

User management
With the integrated user management, “users” can be created directly in the visualization during the engineering or during operation. In the user interfaces, it can be determined for every separate element which user group may view or operate it.

Alarm management
The CODESYS alarm management allows defining erroneous and critical system states. If an error condition occurs, it is registered and displayed and then acknowledged by the user according to predefined procedures. The optional archiving function enables tracing and documenting incidents. Alarm events can be both triggered and processed by the IEC program.

Visualization styles:
Format templates for the visualization
With visualization styles in CODESYS, a certain number of element properties can be specified in a style file. When the employed style is changed in the visualization manager, all elements supporting this style are switched automatically within the visualization. Without the project having to be changed, the display can be adjusted to the customer’s corporate design. All standard elements in CODESYS support styles. A separate style editor is available for creating new visualization styles.
Extensive selection of visualization elements

CODESYS already offers a large number of basic elements and controls, with many adaptation options. Using these, the user can quickly and easily create attractive and high-quality visualization interfaces for widely varying applications in the automation industry.

Optional extension

Manufacturers and users can expand the extensive set of available elements by their own system- or industry-specific visualization elements. All new visualization elements integrate themselves into the toolbox of the CODESYS Development System.

The optionally available CODESYS VisuElement Toolkit is needed for this extension. The elements themselves are created directly in the CODESYS Development System using the language resources of the IEC 61131-3 – no further platform required.

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Switching the language

The CODESYS Visualization offers consistent Unicode support. Texts can be displayed in all languages and characters, e.g. in Chinese or Cyrillic. The display texts are managed in text lists, which can be translated independently of the current project.

Re-usability through visualization objects with parameter interface

A visualization screen can itself be embedded into other visualizations as an object (image in image). Furthermore, the object can be connected with different data through a parameter interface. This means the visualization objects can be re-used flexibly, comparable to the object-oriented programming of function blocks in IEC 61131-3. After an object is changed, every occurrence of it is adjusted automatically. Such visualization objects (faceplates) can be stored in libraries together with the appropriate function blocks.
CODESYS Development System

- Creation of user interfaces
- Diagnosis
- Commissioning/maintenance/service
- OS: Windows

CODESYS HMI

- Data of one/multiple controllers in one visualization
- CODESYS Data Server for data exchange
- All visualization functions are computed on the panel
- OS: Win, WinCE, Linux

WORKSTATION

- Touch Panel
- Mobil Panel

IPC

- CODESYS Control RTE
  - For controller tasks
  - Optional: Motion + CNC
  - OS: Windows

PLC

- CODESYS Control
  - For controller tasks
  - OS: Any
CODESYS TargetVisu

- Logic application & user interface on a single device
- Platform independent
- Efficient access to data without communication overhead

CODESYS WebVisu

- Remote access with standard browser
- Based on HTML 5 + JavaScript: runs on all common smartphones and tablets
- CODESYS WebServer locally on the controller

Optional integrable CODESYS Web Server is prerequisite for CODESYS WebVisu
Product variants

The user interfaces created in CODESYS can be used in different display variants, depending on which are supported by the controller that is being used.

Display variant integrated in the CODESYS Development System
The integrated visualization in the CODESYS Development System is perfect for application tests, service or diagnosis purposes, as well as for commissioning a system. As soon as the user is connected to the controller, the interface editor switches to an animated display of the elements. This variant is part of the free CODESYS Development System and is always applicable, regardless of which controller is being used.

CODESYS HMI – System-wide access to process values
The user interfaces created with CODESYS are displayed on a detached display device. This eliminates the computational load on the controller. Communication with the controller is realized via the CODESYS DataServer. The server uses the same communication mechanisms as used for monitoring in the CODESYS Development System.
This variant is perfect for operating and monitoring the machine on site and it also allows the values of multiple controllers to be displayed in one visualization. The visualization is displayed on one or several control panels without controller functionality or I/O-control. Apart from Windows PCs, operator devices with different operating-system-platforms can be used.
CODESYS TargetVisu – Machine and system operation on site
This platform-independent variant shows the user interfaces directly on the controller: on an integrated or a connected display. As such, the controller and the visualization are combined on a single device – perfect for operating and monitoring machines and systems. To be able to use the CODESYS TargetVisu, an optional extension of the runtime system is necessary.

CODESYS WebVisu – Service and diagnosis through worldwide access
The web-based display variant of the CODESYS Visualization enables remote access, remote monitoring, and service and diagnosis of a system over the internet. A standard web-browser communicates (optionally with SSL decryption) with the web-server in the controller via JavaScript and displays the visualization by means of HTML5. This technology is supported by nearly all browsers, and is therefore also available on devices with iOs or Android.
Integration by device manufacturers

Device manufacturers can use the CODESYS Visualization on practically all platforms: based on the scalability, the visualization runs on embedded controllers, right up to high-performance, PC-based systems, independently of which operating system is used, e.g.: Windows, Windows Embedded CE, Linux, QNX, or VxWorks. For these operating systems, a ready-made adaptation to the graphical interface of the system is available. Only embedded controllers or other operating systems require an adaptation.

The product portfolio encompasses the different display variants, as described on pages 8 and 9. Additionally, device manufacturers can embed the user interfaces of the CODESYS Visualization into an external application by means of ActiveX-control.

The advantage: Every display variant can be used both singly and in parallel; the display of the user interfaces is identical on every display device and for all display variants.

Device manufacturers can activate the supported display variants in their devices by adding certain runtime components to match the requirements.
The benefits at a glance

- Ability to create visualization objects with a parameter interface:
  For each IEC 61131-3 function block, one or more appropriate visualizations can be created.
- Creating customized elements in IEC 61131-3, which can be used in all display variants
- Adjusting the same visualization to different designs, without effort, via visualization styles
- PLC functionality and visualization in one device. No communication effort because of direct access to variables
CODESYS – the manufacturer-independent IEC 61131-3 automation software.

CODESYS Product Families:

- Engineering
- Runtime
- Fieldbus
- Motion + CNC
- Safety
- Services

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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.