

ELCAD

The power of 7

**ELCAD 7 - Functions,
scaling and options**



AUCOTEC

Functions, scaling and options

Range of functions

ELCAD provides you with a tried and tested, database-driven and professional CAE system in all aspects, which was developed for the specific requirements of electrical engineering and mechatronics.

ELCAD can be scaled from challenging design in mechanical engineering to the engineering of process control plants.

ELCAD efficiently supports the complete workflow in the planning of electrical engineering tasks.

ELCAD is characterized in particular by its flexibility when designing and its integrated range of functions.

Basic functions and operation

The fact that the controls correspond to the familiar and widely used applications of the Office world facilitates the handling of ELCAD significantly; you do not have to learn how to use a dialog because you already know it.

However, the requirement for software ergonomics in ELCAD goes far beyond the handling of individual elements.

Based on the longest experience with graphical user interfaces, AUCOTEC has designed the handling of ELCAD so that the optimal combination of information presentation, fast data manipulation and intelligent support is provided for each work stage.

The symbol-based circuit diagram design is created in ELCAD in an editing view which – according to many ELCAD users – is globally unrivalled in terms of efficiency.

Object orientation in the best sense means providing the necessary functions specifically from a wide range of options, depending on the respective object and the current editing situation.

High degree of automation potential

ELCAD continues to act in a graphically oriented manner, i.e. all required follow-on documents are generated from ready-made circuit diagrams - this is now done fully automatically by processes defined in the project.

The user himself decides whether and to what extent this is standardized and consistent.

Where many things had to be previously performed via laborious manual work, this routine work can now be left to the "pre-planned" processes, thus allowing users to concentrate on the essential design tasks.

Hierarchically structured selection trees, tabular editing as in the spreadsheet for the fast manipulation of large amounts of data and object-dependent menus, which are also always available in graphic editing, are just some of the modules for an engineering tool that sets new standards in software ergonomics.

WINDOWS-compliant and freely configurable data interfaces support the bi-directional data exchange in CSV, XLS and MDB formats or via ODBC drivers.

- Free setting of the interface with regard to window positions, menus, and toolbars.
- Multilingualism in terms of data and user interface.
- WINDOWS-compliant graphic output and printer integration; thus runs virtually in every current hardware environment.
- Pre-defined procedures for the automated process (batch processing and process handling).
- All ELCAD data can be exported.
- Your interface to mechanical engineering: ELCAD facilitates data exchange with AutoCAD, the leading CAD system for technical mechanical drawings.

The proven DXF interface allows both the import of AutoCAD data and the export to AutoCAD drawings.

ELCAD can

- ... adapt perfectly: flexibility in designation requirements, engineering processes and documentation requirements
- ... think internationally: as it is available in multiple languages and can be switched from one to the other, it is designed for global engineering; it can also be used in various standard areas. The appropriate content is also delivered in the respective language
- ... think in an object-oriented manner: structured data storage, high reusability, minimal revision effort
- ... design in a database-driven manner: objects are created, changed and reused in the project database
- ... design in a modular manner
- ... provide international references: companies from all over the world and from all industries have been relying on ELCAD for many years

Multi-user ability

ELCAD generally offers multiple users the possibility of working on the same project at the same time. This does not require any special structuring or subdivision of the project.

ELCAD automatically manages all access and prevents collisions or mutual blocking. The project data always remains logically coherent and consistent in the process.

Module: Graphics Editor

The Graphics Editor is an integral part of ELCAD. It is a tool designed specifically for use in engineering diagrams and is thus geared towards symbol-oriented work.

The functions include the creation of circuit diagrams, hydraulic and pneumatic diagrams, loop diagrams in I&C design, electronic diagrams, general diagrams and free graphics.

The data storage is project-oriented, where the project size is limited only by the hardware itself.

Functions

- Online (real-time) evaluation of the cross-references of relays and contacts, input and output cards, potentials, connector symbols and any other device symbols displayed in a distributed manner
- Hierarchically structured selection trees with extensive possibilities, for example, switching to partial views
- Can be activated: automatically online for symbol placement or editing.
- Availability of a maximum of 256 layer levels that can be activated or deactivated
- Hierarchically structured symbol selection with graphic symbol display and search function
- Automatic equipment numbering freely configurable according to sheet and circuit path, sheet and grid square or automatic incrementing within the device group.
- Differentiation of graphic lines, electrical and mechanical connections
- Automatic connection in horizontal or vertical direction. Freely definable multiple connections.
- Automatic opening or closing of the electrical and mechanical connections to symbol connection points
- Plausibility checks for duplicate assignment of equipment designation, incorrect assignment or overcrowding of relays or other devices displayed in a distributed manner, for example, PLC cards.
- Comprehensive test functions provide the user with helpful information about the current status of the drawing
- Option of illustrating the plant structure according to DIN, that is, with plant designation, function group, location and device designation, variable definition of unambiguous properties.
- Logical inheritance of the globally valid plant, function and location designation from the title block to the devices.
- Online information function for querying and direct assignment of existing plant, function, location and equipment designation and of potentials and connector symbols
- Equipment and terminal editor for central, cross-sheet editing of existing equipment or terminal blocks including terminal numbers. Definition of empty or reserve terminals, navigating from the editors into the diagrams.
- Multiple connections in series as well as twin-tier and multi-tier terminals
- Free definition of the physical sorting of terminals in the block
- Navigation function for the direct page change based on the cross-referencing of devices or potentials.
- "Go to" function for displaying all references associated with the device including direct selective navigation
- Automatic assignment of contact numbers for separately represented devices such as relay coil and relay contacts
- Automatic incrementing of terminal numbers (can be disabled)
- Automatic inheritance of equipment designations for aligned terminals (can be disabled)
- Operation via freely configurable toolbars, in addition to operation via standard controls
- You can use drag & drop to easily and quickly place devices or to assign devices and symbols.
- The management of "translate texts" enables the creation of entirely language-neutral diagrams and fast, centralized switching between

different diagram languages. Up to four languages can be displayed at the same time per project.

- Drawing management with up to five hierarchical naming levels each with 32-character sheet naming, whereby blanks and special characters are also allowed. Possibility of multiple use of the same page number for different sets of drawings within a project. Output option of the diagram list.
 - Document structure with extensive marking functions
 - Output option of equipment overviews, terminal and terminal block overviews, where the terminal and equipment lists may be output both on a printer as well as in any data formats (such as XLS) on storage media. The terminal overviews provide terminal number, display location as well as internal and external destination.
 - Graphic output and global manipulation via batch processing for the entire project or selectively for individual pages.
 - Executable processes offer a high degree of automation potential, and thus save users from having to perform routine work.
 - Graphic output via WINDOWS standard drivers as well as via internal vector drivers for the most common printer languages. Freely scalable graphic output.
 - Copy functions for copying entire projects, parts of a project, single pages or sheet excerpts (also external). For page-related copying, you can also select whether the copying is to be done with or without resetting the texts to the default values.
 - Editing and copying functions can always be related to the entire sheet, X or Y excerpts or parts of the window. Options for selective editing according to such specific criteria as missing equipment designations or missing item numbers, and also selectively from specific symbol types or symbol names.
 - At the same time, users can have access to four symbol libraries with up to 10,000 different symbols per project.
 - Assignment of items from the item database. Searching the item database via freely definable search keys
 - Graphic files can be integrated into the drawings, symbols or macros; the formats BMP, PCX, JPG, TIFF, etc. can be used.
 - The component selection tree is a direct part of the Graphics Editor; the components can be placed in the circuit diagram via drag & drop.
- Symbol-oriented Graphics Editor optimized for diagram creation.
 - Online references for devices, potentials and connector symbols displayed in a distributed manner.
 - Navigation through all logical references of the project.
 - Internal and external copying at different levels of abstraction.
 - Library of circuit components, can be freely extended.

Module: Symbol Editor

The extremely powerful Symbol Editor enables the convenient, menu-driven creation of new symbols and form sheets and the changing of existing symbols.

The Symbol Editor is identical in use to the Graphics Editor in order to facilitate work.

- Creation of symbol graphics using graphic basic functions and text placeholders
- Creation of symbol logic using a dialog editor
- Freely definable dialog blocks that can be used repeatedly
- Possibility of automation of symbols with the functions Integrator (string link), Calculator (calculation) and IF-THEN-ELSE loops and system variables
- Definition of cross-reference logic
- Management of symbol libraries
- List of symbols with date and time of last saving
- Definition of variable symbols whose graphics adjust automatically by means of logical symbol content
- etc.

The IEC symbol library contains approximately 1,000 symbols, compliant with:

- EN 60617 (IEC 617)-2 to 12	Graphic symbols
- EN 61082 (IEC 1082)-1 to 4	Electrical engineering documents
- EN 61346 (IEC 1346)-1	Structural principles
- EN 81346 (IEC 1346)-2	In parts, document designation
- DIN 6771-5	Title blocks
- IEC 750 + 204-2	Object name

The delivery data for ELCAD also includes device master data (catalogue) records and ready-made macros in addition to these IEC-compliant symbols.

Module: Terminal Diagram

The terminal diagram as well as the graphic terminal connection diagram are follow-up documents which represent the terminals set in the circuit diagram with the associated cables and target devices. The display is in tabular form in the terminal connection diagram.

The cables are combined and the external target devices are displayed as symbol graphics in the graphic connection diagram.

- Freely customizable, horizontal and vertical display.
- Representation of terminal block designators, terminal number, terminal comment and display location of the terminals in the circuit diagram.
- Representation of overall equipment designation, connection designations, device comments and item number of internal and external target devices, cable name, number of cores, core cross-section, core number and colour, etc.
- Wire jumper and insertion bridge.
- Multiple destinations possible per terminal.
- Automatic page break if the cable table or terminal strip is full.
- Page break can be configured for change of plant, function and/or location.
- Graphic of the external devices in the connection diagram can be freely defined (different from the circuit diagram).

Module: Cable Planning

The Cable Planning module is divided into three main functions:

Cable routing diagrams

- Cable representation in a single-line diagram in which a connection can represent a single cable or a cable run that contains multiple cables.
- Graphic list of cables belonging to the cable run in the cable routing diagram.
- Tabular editing of cable runs. Routing distance definition.

Cable planning

- Management of cables in tabular form with hierarchical substructures for each individual core.
- Cable and core selection from the Graphics Editor using search function.
- Checking for repeated use of cores, excessive allocation of cables and incorrect local planning of cables.

Switching box

Switching lists can be generated from the cores contained in the circuit diagram. The editing takes place in a manner specific to the location and equipment, based on certain switching cabinets.

Report functions

- Output of cable lists, switching lists and cable run overviews optionally as list, graphic or in any data formats (for example, XLS).
- Free definition of output formats
- Use of formulas and constants
- Calculation of totals and subtotals
- Definition of criteria for block formation and form feed
- Free definition of output sorting (five sorting levels)
- Free definition of output filters
- Quantity count
- Position and page numbers
- Free sheet header text
- Use of "translate files"

Module: PLC (input/output components)

The circuit diagrams display the inputs and outputs of the PLC. The absolute and symbolic addresses as well as the function text can be entered in these symbols.

The assignment list module (ZL module) enables the bi-directional exchange of this information between the PLC programming device and ELCAD.

- Online management of the PLC absolute and symbolic addresses and the comments
- Assignment list editor with syntax check for the creation or maintenance of address lists
- List output of assignment lists
- Usability of translate files (multilingualism) in assignment list comments
- The symbols that are necessary for working with the ZL module are included in the standard system.
- ODBC-compatible interfaces to PLC systems

Module: Revision Management

Electrical engineering documents are not just a number of drawing sheets for which it would suffice to remember the last change date.

They are characterized by a high degree of interconnection. A change in one sheet may result in changes to references on other sheets, which are automatically maintained of course in ELCAD.

The automatic revision management in ELCAD detects all changes in documents - thus the changes made manually as well as those automatically generated or those which resulted from tabular editing - at the push of a button.

You can rest assured in letting ELCAD decide whether a new revision must be created from a sheet.

A document is created on request, which clearly highlights all changes with respect to any comparison status. Of course, the identification of revisions can be fully customized to your corporate standards. This is well-known ELCAD philosophy.

Module: Materials Management with fixed or freely accessible list structures

The ELCAD module Materials Management is an integral part of ELCAD and enables the creation, editing, and output of project-related BOMs (bills of material) and device lists, tables of contents, terminal BOMs, wiring lists and status lists based on the drawing and device master data (catalogue).

All lists can be edited directly via an Excel-like table view and provide the opportunity of applying all changes in the graphic diagrams. The module also provides the integration of device master databases (catalogue databases).

The complete maintenance of the device master data (catalogue) is performed directly in ELCAD with this module. All device data can be accessed, for example, from the Graphics Editor.

The Materials Management module is available in two configurations which differ only in the degrees of freedom of the list structure:

- In the Materials Management module with a free list structure, you can define the attributes which are used as columns in lists. Thus ELCAD adapts to any corporate standards or customer requirements.
- In the documentation module with a fixed list structure, you resort to specified definitions of list structures.

Both variants can be combined so that some users have free list definitions in order to perform customizations, while others only fulfil these requirements through the use of fixed list structures.

Thus the conscious restriction to corporate standards must be ensured.

Module: Cabinet Layout

The Cabinet Layout module supports the interactive creation of layout diagrams. For this purpose, it automatically offers in the Graphics Editor the layout symbols to be placed for the cabinet.

This is based on the data from a current material and device BOM, which can be preselected according to any criteria (for example, by location).

Functions

- Automatic selection of the correct layout symbols using the item number or a variable standard symbol
- Automatic resizing of the symbol taking into account the scale of the sheet and the unit of measurement
- Cross-reference capability and adoption of comments and equipment designations from the circuit diagram
- Associative dimensioning function

Module: I&C Design (AUCOPLAN)

A range of functions developed especially for the planning of plants used in I&C design engineering always provides an optimum overview from the transfer of process engineering data to the creation of complete I&C design documentation. Functions

- Specifying devices and process engineering equipment and access to device master data (catalogue)
- Efficient creation of signal and loop diagrams using typicals and "tag models"
- Hook-up and assembly design with material quantity calculation
- Online capability of all instrumentation and tag data; database-driven engineering of plant data
- Transferring process engineering data via standard interfaces
- Free plant and location structuring
- Cabinet design and layout via cabinet wiring lists
- Documentation tool for creating function diagrams with signal tracking and check functions, freely selectable display forms of logic symbols

Demo version and viewing mode / ELCADview

ELCAD demo mode

ELCAD starts in demo mode if you do not have a valid license. In demo mode, you can open projects which have a circuit diagram comprised of eight sheets or 100 devices (Studio) **at most**.

On the other hand, the follow-up documents generated from the circuit diagram are unlimited. Apart from a few exceptions, the ELCAD range of functions is available completely in demo mode.

ELCADview mode

If you open a project in ELCAD with a circuit diagram comprised of **more than eight sheets** or 100 devices without a valid license, ELCAD switches **automatically** to the license-free ELCADview mode.

The free ELCADview is used as an intelligent documentation and maintenance tool with the easiest handling in the service and end user area.



ELCADview offers plant operators "read-only" access to the complete project documentation, which enables navigation within a project.

The optional module ELCAD*maintenance* extends the application possibilities of ELCADview and provides information management for the complete machine and plant documentation.

Viewing mode / ELCADmaintenance

ELCADmaintenance

ELCAD*maintenance* offers comprehensive information management for the complete machine and plant documentation.

In addition to the created circuit diagrams and general diagrams, all external documents such as operating and maintenance instructions or assembly instructions are provided.

Convenient search functions enable quick access to all objects in engineering.

Wildcard inputs are also possible. Navigation with the **Go to** function is unique. It gives the maintenance or manufacturing operator the required overview of the documentation and likewise permits quick access.

With the maintenance tool, the technical documentation of the plant is available in paperless form. Thus information not even available in paper documents is rendered accessible.

ELCAD*maintenance* enables access to all of the data stored, for example, in BOMs or supplementary documents. The fastest possible access is ensured whether during operation, in the manufacturing process or in the event of serious problems. The redlining function offers unique convenience for change requests or the documentation of changes: using this function, corresponding graphic markings can be created quickly and easily; supplemented with notes, they can then be handed over to the design department where they can be evaluated or edited with ELCAD.

ELCAD Studio

ELCAD Studio can be used to directly integrate modular design based on standardized function modules into an E-CAE system.

Reusable modules can be predefined or compiled from already designed machines and plants in an ELCAD template project.

These standardized "**modular systems**" contain all information for the I/O list, device definitions and specifications as well as the required external documentation in addition to the actual circuit diagrams.

In a work project, these templates can be accessed via search keys or filter criteria and may be copied any number of times in a single operation.

ELCAD Studio also offers the option of variant management at the same time. Function-oriented standard modules only need to be defined once, their specific application-dependent components and parameters are automatically assigned via the selected variant.

This saves the conventional maintenance and set-up times. Variants can be subsequently defined and changed.

If the modules to be used in a plant are compiled in an external tool, ELCAD Studio offers intelligent delta management. Changes and differences with respect to the current data status are determined, the import and export can take place in a controlled and transparent manner.

Functions

- Defining reusable modules for faster project creation
- Variant management with automatic assignment
- Delta management for error-free data import and export
- Modular, object-oriented design in alphanumeric or graphic editing view
- Object changes are updated once online for all representations
- Device definition can also take place in a time-saving manner without generating the circuit diagram
- Simple tabular editing of all structure and device data possible
- Online cabinet concept with direct placement from a hierarchical device representation in the cabinet; all unplaced devices at a glance in the layout view
- Easy integration of external device data in all data formats
- Central change management

ELCAD SE

ELCAD SE (SE stands for **S**pecial **E**dition) provides the performance features of an ELCAD professional, but with the project size limited to a circuit diagram with one hundred sheets at most.

On the other hand, the follow-up documents generated from the circuit diagram are unlimited.

This constitutes a module with unbeatable cost-effectiveness as an affordable entry-level option for companies that tend to have smaller projects with circuit diagrams of up to 100 sheets.

Scaling

- available as an option
- ✓ included
- not available

Basis-Lizenz	ELCAD view	ELCAD maintenance	ELCAD plus	ELCAD SE 100 Sheets	ELCAD Professional	AUCOPLAN Basic	AUCOPLAN (full version)
Optionen							
Multi-user ability	✓	✓	✓	✓	✓	✓	✓
Basic functions, operation	-	-	✓	✓	✓	✓	✓
Graphics Editor	-	-	✓	✓	✓	✓	✓
Symbol Editor	-	-	✓	✓	✓	✓	✓
Terminal diagram	-	-	✓	✓	✓	-	✓
PLC module	-	-	✓	✓	✓	-	✓
Revision management	-	✓	✓	✓	✓	✓	✓
Documentation module, fixed structure	-	-	✓	✓	✓	-	✓
Documentation module, free structure	-	-	-	✓	✓	-	✓
Cable planning	-	-	○	✓	✓	-	✓
Cabinet layout	-	-	○	✓	✓	-	✓
I&C design (AUCOPLAN)	-	-	○	-	○	✓	✓
Maintenance	✓	✓	○	-	○	○	○
ELCAD Studio	-	-	-	-	○	-	-

Options

MECHATRONIC EXPLORER

The MECHATRONIC EXPLORER (ME) is a unique system for linking and visualizing complex CAE data. As an integration platform for supporting the operation and maintenance of electrically controlled plants or machines, it not only offers intelligent navigation, shopping basket, bookmarks or redlining functions for the change documentation, but also the direct evaluation of error messages in process control rooms.

The MECHATRONIC EXPLORER visualizes circuit and cabinet layout diagrams, cable and terminal diagrams, pneumatic/hydraulic diagrams, mechanical drawings in pixel format, photos, PDF documentation, BOMs, cable lists and cable core connection lists, terminal and PLC allocation lists. The intelligent navigation function uses the interlinking of documents and lists and thus facilitates the fastest possible orientation on the part of service personnel and users, even within very extensive and complex plant documentation.

Integration and automation modules

Command language

Interpretive API for customer-specific evaluation and automation solutions.

No specific development environment and little experience in software development are necessary for using the ELCAD command language. It can be used independently of the ELCAD bundle that is used.

Data server technology

Allows automated access by other applications to all project planning and master (catalogue) data in ELCAD.

The data exchange is handled in CSV, XLS and MDB formats and via ODBC drivers. The data server technology enables automated data exchange of alphanumeric data in various standardized formats.

No special operating system components are required and there is no interference with external applications or data.

EDM/PDM integration

The EDM/PDM link offers a flexible integration option for various EDM/PDM systems and provides functions for archiving, management and project editing.

It enables seamless control of ELCAD by an EDM/PDM system.

Graphical interfaces

DXF/DWG at logic level (symbol-oriented and attribute-oriented)

Interfaces for data exchange including logic (symbols, attributes). Interface for supporting interdisciplinary data exchange, for example, of site plans, layouts or process engineering flow diagrams.

VNS with diagram intelligence

Bi-directional exchange of graphic and logical data via the process-neutral interface (VNS), for example, symbols, attributes and links.

TIFF for transferring to archiving systems

Export option of graphic data in TIFF format. Supports automatic data storage in archiving systems and enables integration in the EDM integration module.

PDF (single page) for transferring to archiving systems and PDF (multi-page) for customer documentation

In single page format for transferring to archiving or information systems. The PDF multi-page format includes accessing the documentation via the project structure for the customer's final documentation.

Interface to the DOCware Parts Publisher

For the fully automatic transfer of electrical engineering projects from ELCAD to the PARTS PUBLISHER catalogue system, AUCOTEC and DOCware jointly developed a standard interface which works as a plug-in in ELCAD.

What is the Parts Publisher?

The Parts Publisher from Docware is a software for professional management and for the optimized provision of spare parts data as well as service and product information.

Spare parts catalogues and service information systems are automatically created and updated in an optimized manner. In addition, the software can be used to set up spare parts shops and service portals.